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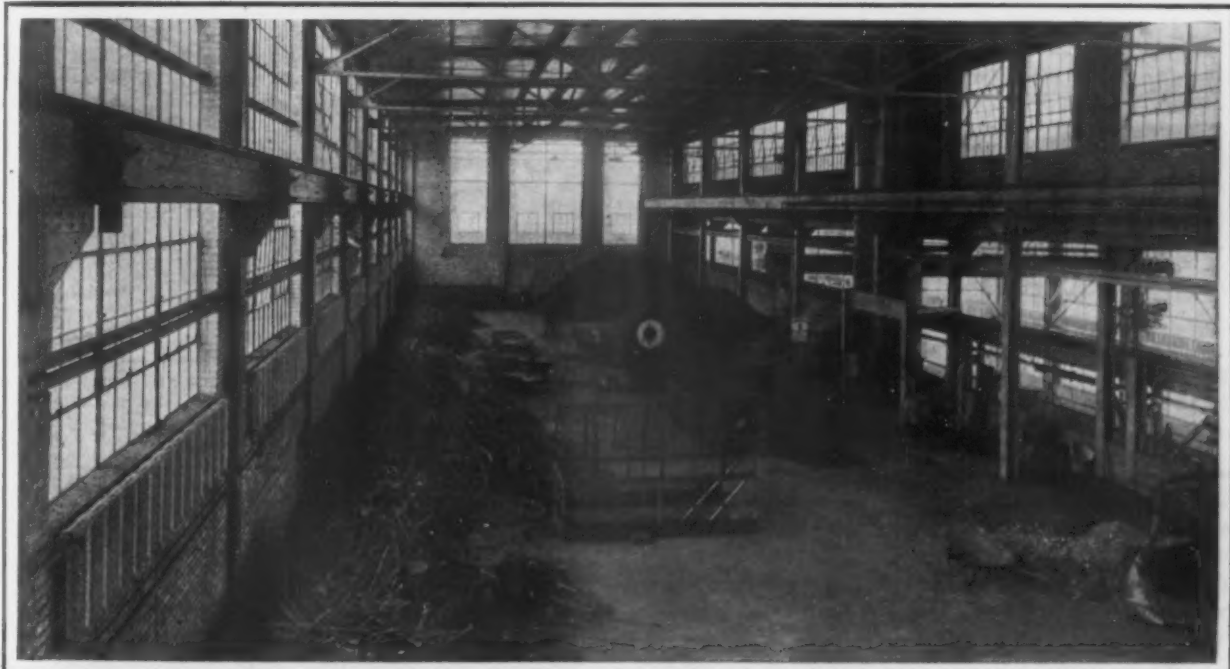
Charging Floor with Undercover Storage

Careful Hand Molding for Semi-Steel Printing Press Castings—Raw Materials Unloaded in Single Operations—Core-Making Expedited with Special Cement Boxes

—BY EDWIN A. HUNGER—

IN the design and construction of the new foundry and machine shop of the Duplex Printing Press Co., Battle Creek, Mich., manufacturer of newspaper printing presses and accessory stereotyping machinery, numerous innovations have been incorporated to lessen manual work as much as possible, and provide for the comfort of the men. In the foundry proper

tirely under cover add much to the convenience of handling materials, and particularly to the comfort of the men in cold and snowy weather. The loading and unloading tracks, moreover, are placed in separate bays, which, when cars are being pushed in or out, can be segregated from the shop and the foundry by electrically-operated steel aprons, thus preventing cold



This Ample Charging Floor, Entirely Under Cover, Extends the Length of the Foundry. Storage capacity for 5000 tons of metal and ten carloads of coke, and a central weighing station, opposite the cupola, are features

the big charging platform, entirely under cover, with storage capacity for 5000 tons of metal and ten carloads of coke at one time, is worthy of note. So also is the method of loading all raw material from freight cars entirely under cover in single operations, either through manholes to proper bins underneath the charging platform, or to special places therefor on the platform. The arrangement of foundry and machine shop, placed end to end, as it were, with cranes of machine and erecting shop and foundry overlapping, thus providing efficient means for straight-line routing of work, also deserves special mention.

Located in Michigan, where the winters are none too mild, the facilities for unloading and loading en-

tirely under cover add much to the convenience of handling materials, and particularly to the comfort of the men in cold and snowy weather. Henry F. Bechman, vice-president of the company and superintendent and designer of the plant, has found that nothing is so irritating to foundrymen as digging around in snow for metal and other material. In planning the new plant, therefore, he made it a special point to work out this undercover unloading and loading arrangement.

Both foundry and machine shop are of steel construction, with all-glass walls and monitor roofs, making it possible for the men to work under best daylight conditions. The ventilating system in the foundry, of the Pond operating type, keeps the room clear of gases at all times. The foundry is 110 ft. wide by 180 ft.



Metal Can Be Moved from Storage on the Charging Floor to Scale, or to Charging Floor Trucks, by Magnet, without Need for Manual Handling. Cupola in background has two charging doors

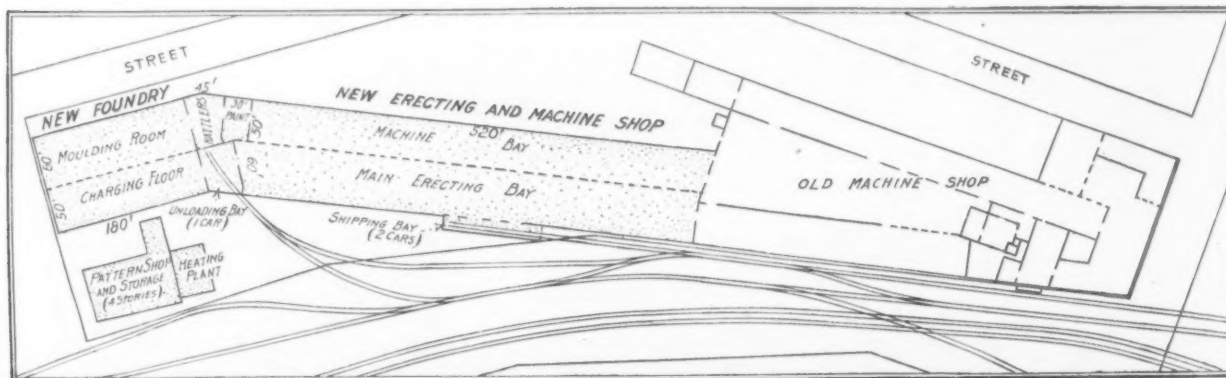
long, while the new machine and erecting shop, adjoining it on the east, is 520 by 110 ft.

lifted by a Cutler-Hammer 6-ton magnet the full height of the crane and then dropped.

The spacious charging floor, the full length of the foundry, rests on heavy 30-in. I-beams. It is 50 ft wide and has a 10 x 10-ft. extension over the foundry proper at the east end, which serves as a special loading and unloading platform for the main foundry. Holes are provided in the charging floor for rods to hold coke storage boards in place.

The Whiting cupola is provided with double charging doors, is 60 in. in diameter, and takes from 15 to 16 tons of metal. Charges are weighed on a Toledo scale, and are conveyed about the platform in Whiting all-metal cars, six being of 500-lb. and six of 2-ton capacity. Thus, with these cars and with charging-platform-stored coke and metal to depend on, operations could be carried on, even with the charging platform crane temporarily in disuse.

Underneath the charging platform, going east to west, are storage area for flasks, two sand bins, cupola bay with cinder mill and storage for fire clay, core room and core ovens, storage for active patterns and wash and shower room. Two chutes are provided in one of the sand bins, one for facing and the other for blacking, both materials being unloaded into the chutes through holes from the charging platform above. A hole is also provided in the charging floor above the cupola bay, through which the magnet can be lowered to separate metal from cinders taken from the cinder mill. The flask-storage area and the core room are each served by two Detroit hoists (four in all) which have overhead tracks extending out into the foundry,



Devoted Entirely to Making Newspaper Presses and Accessory Stereotype Equipment, the New Machine and Erecting Shop and Foundry Are End to End, and to the West of the Old Portion of the Plant

Both foundry and machine shop are heated by steam radiators located overhead along the walls, as shown in the illustrations. The heating plant is in a separate building. Other buildings adjoining the main machine shop are devoted to machining smaller press parts, and assembling the stereotype machinery. A separate building of four stories is devoted to pattern making and pattern storage.

The unloading bay for raw materials is at the east end of the foundry, and between the foundry and the erecting bay of the machine shop. It is entirely inclosed and will handle one car at a time. Outside, the track divides into two spurs, onto one of which empty cars can be shunted, while loaded cars can be kept on the other. Material is moved from the cars, either by magnet or grab-bucket, and hoisted by a 5-ton Shaw crane to places provided for it. Sand is dropped through manholes into bins underneath the charging floor.

Since crane-ways of both erecting shop and charging floor overlap in this bay, machinery can be unloaded here also, and then conveyed to the machine and erecting shop or foundry as desired. A pit in the unloading bay is provided for breaking up big pieces of scrap iron. This is done by a 1-ton ball, which is



In the Core Room Are Two Through-Type and Three Tray-Type Ovens. For handling long cores, two trucks can be fastened together



General View of Foundry from East End of Charging Floor. Cupola spout is visible at left beneath end of crane

so that the foundry cranes can pick up their loads. All flasks are stored indoors, this also being especially convenient during the winter.

All flasks are of metal. The foundry is served by a 10-ton and a 5-ton Shaw crane, and all castings are conveyed to the cleaning room by magnet, thus obviating the need of using awkward and sometimes dangerous tackle.

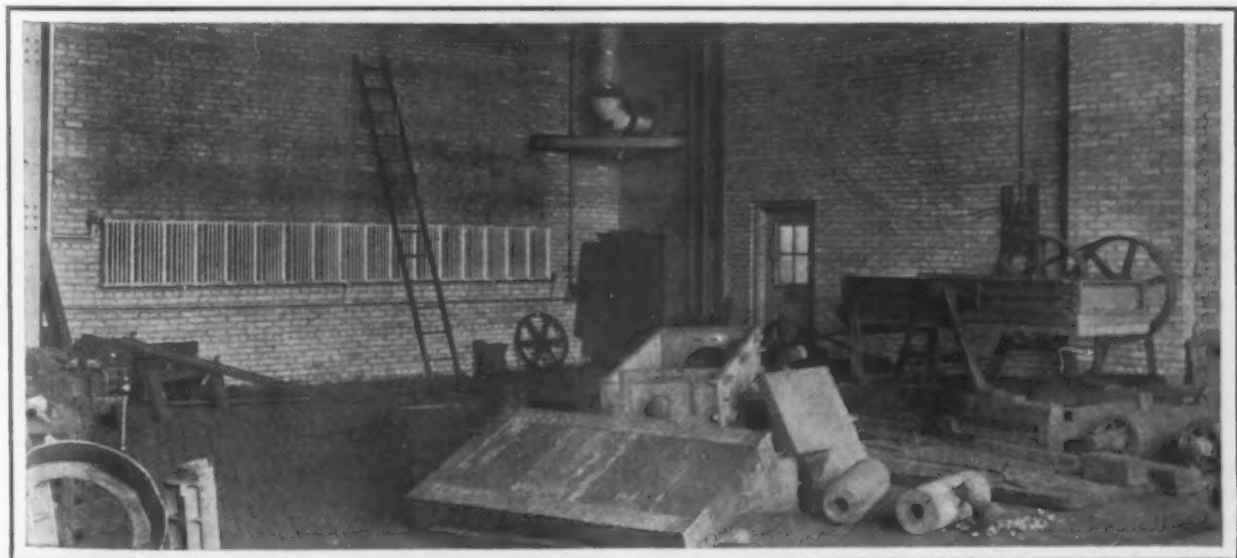
For casting the various parts of printing presses and accessory equipment a high grade of metal and workmanship is required. All molding is done by hand, and is carefully supervised and inspected. So far as possible all operations are standardized. Workmen trained particularly for this special kind of work, by years of experience, know that the least flaw will mean the scrapping of their work, and so are taught to strive for quality in everything they do.

In the scrap metal which is used in the melts from 20 to 30 per cent scrap steel is employed; hence the company speaks of its machines, to the trade, as of

semi-steel. In fact, the quality of the metal is considered so high that Mr. Bechman uses it to make the bushings (ordinarily made of tool steel) for all the jigs in the plant that can be hardened.

Many of the castings are large and of peculiar shape, and so, for cleaning and machining, require special equipment. This refers especially to the side frames of the big tubular presses, varying in length from 8 to 16 ft., and in weight from 2000 to 3400 lb. In the making of the press cylinders also, varying in weight from 800 to 4600 lb., an original method of core-making, molding and pouring has been developed. Usually, cylinders of such size are cast vertically; in the Duplex foundry, however, the more difficult horizontal method is employed. This is done by means of numerous gates and careful workmanship obtained through close supervision and numerous repeat operations.

Much of the work of the foundry is also devoted to making inking rolls, varying from 150 to 1500 lb. in weight. Gears, employed in goodly numbers in presses,



Two Big Rattler Boxes, One Revolving End for End and the Other Rolling Over Like a Log. Are Used to Clean Up Castings. The second box takes the long press side frames

call for the making of blanks varying from 3 to 60 in. in diameter.

In making cores, time and labor saving methods have been developed, which at the same time have helped to make better castings possible. Take, for instance, the making of cores for stereotype casting boxes (200 to 300 lb., and cylindrical in shape): a scheme has been worked out which dispenses with much work of the pattern maker and, moreover, has brought about a 300 per cent increase in production.

In making the core box for these casting boxes the pattern is placed on a bottom board inside a frame. A mixture of lake sand and cement is then rammed around the sides. After drawing the pattern, the cement mold is laid aside to harden. Another frame of the same dimensions is laid on top of the first frame, and a similar mixture of sand and cement rammed on the top of the first parting, thereby forming a perfect joint. This upper part is also permitted to harden.

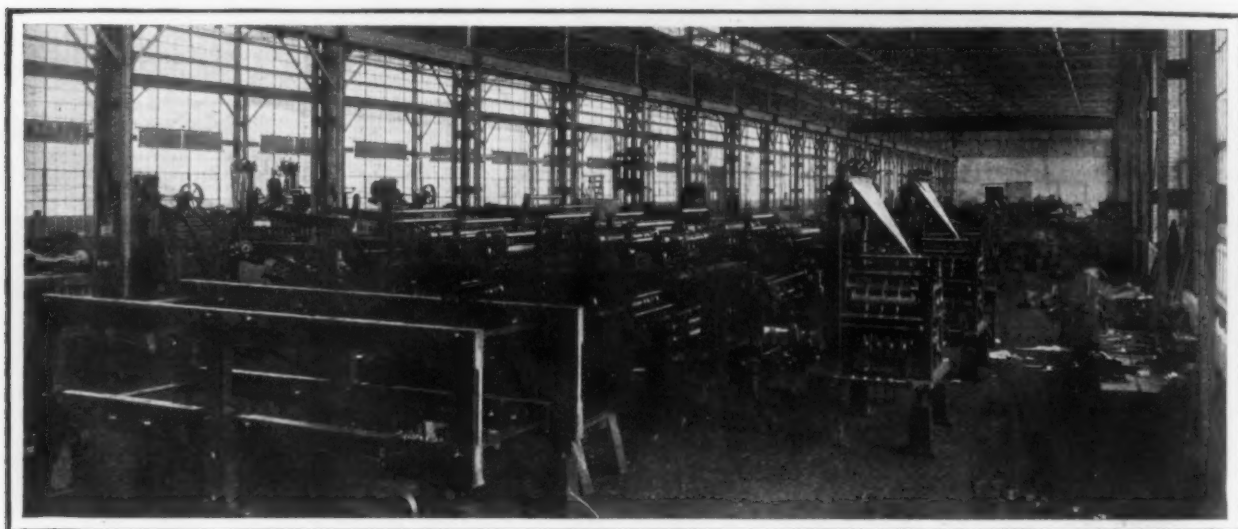
When a core is needed for the casting, the core-maker first places the pattern in the lower core box and rams it up with core sand. He then removes the pattern, turns it over and places it in the other half of the box, ramming up that also. Lifting the pat-

was done with numerous gagers to hold up the pockets, a tedious operation which did not lend itself so well as the present to the prevention of spoilage.

The core room is well lighted, and is equipped with three Whiting tray ovens and two Whiting through-type ovens, with six core-rack trucks serving the latter. Two of these trucks can be fastened together for supporting long work. A ten-barrel core-oil tank is mounted up above, and pipes lead to all core-making benches. An opening on the charging platform permits filling this tank.

An interesting rattling equipment has been developed to take the big side frames. This consists of a huge box 18 ft. x 16 in. x 54 in., which is revolved on its lengthwise horizontal axis. Use is also made of a smaller box, 9 ft. x 18 in. x 40 in., to take smaller castings. This is turned end over end, and can take two press cylinders at one time.

From the rattler and cleaning room the castings are taken to an adjacent room, where they are carefully painted. Air chisels are also used to clean the castings. From the paint room the castings are picked up by crane and taken to their proper places for machining, in the big machine shop. Small castings are taken



Erecting Bay of the New Machine Shop, 520 Ft. Long. All presses are assembled and thoroughly tested here before shipment

tern, he runs the two halves into the core oven. When thoroughly baked, the two halves of the core are assembled and the casting poured in the regular way. This method has proved more economical and expeditious than would have been possible with a regular set of core boxes. In the old days, in making these cores for casting boxes, green sand was rammed in, and to make a single core one man and helper were kept busy an entire day. Now, it is possible for the same workmen to make three or four in a day.

In the old days, also, the cores for the platen of a steam stereotype table, a rectangular casting 24 x 36 in., with one side flat and the under side reinforced with numerous ribs, were made with a deep-drafted pattern with intricate pockets, which entailed much skill and patience on the part of the molder. Here, too, the making of three or four cores by a highly skilled man was considered a good day's work; with the new method developed, one man can easily make a dozen in a day.

In making this core, instead of the usual core box method, dry sand is rammed around the pattern and the core baked in the regular manner. In making heavy press bed plates, time and labor are saved by making four separate cores with dry sand; whereas in the old method, when using green sand, the work

on further by truck to machines in buildings adjacent to the big shop.

As mentioned before, the new shop is divided into a machining and an erecting bay. All the planers and lathes for finishing the big frames and turning the cylinders in the machine bay have individual drive. This bay is served by a 5-ton Shaw crane and the erecting bay by two 5-ton Shaw cranes. The machine and erecting shop crane runways overlap those from the foundry, so that work can easily be picked up by one set or the other as desired, without any manual handling.

All presses, before being sent out, are built up on the erecting floor and given a thorough test. They are then taken down, the various parts crated and loaded onto cars in the loading bay, two cars (the capacity of the bay) being required for the big tubular presses.

In designing the new foundry much thought was given to provisions for future expansion. Hence, with the foundry laid out as it now is, another cupola could be built opposite to the one now in place, both being served by the present charging floor, and an extension built south of the present building, where men serving the added cupola could work apart from men in the foundry now in operation.

Taylor Society in Annual Meeting

Holds Sessions Devoted to Plant Managers, Sales Executives, Office Managers, Labor Managers and Chief Executives

THE annual meeting of the Taylor Society this year was in the midst of an industrial depression. In recent years the Taylor system of scientific management has functioned in an era of relative prosperity and rising prices. Now it has an opposite kind of period to deal with, and it will pass through a severe test. Watching this test will prove of interest. This was one of the main thoughts at the annual meeting in the Engineering Societies Building, New York, Dec. 1, 2 and 3. The president of that plant where the system was first installed 18 years ago maintained that the system was functioning well during the present depression and he would make no innovations.

There were separate sessions for sales executives, plant managers, office managers and labor managers, as well as general sessions. For the first time in the history of the society attention was paid to the concrete problems of the man in general control of an industry. According to the report of the managing director of the society, Dr. H. S. Person, the society first gave attention to the scientific management of the shop. Several years ago attention was paid to the management of industrial relations; later to selling; finally, to scientific management in general control.

There was a record registration of 536. The closing function was a luncheon to Henry R. Towne, chairman of the board Yale & Towne Mfg. Co. and honorary president of the Taylor Society. Speakers were Mr. Towne; Wilfred Lewis, president Tabor Mfg. Co., Philadelphia, and Calvin W. Rice, secretary American Society of Mechanical Engineers, all of whom belonged to the mechanical engineers' organization in the days of the presentation by Mr. Taylor of his famous papers on belting, piece rate systems, shop management and the art of cutting metals.

Sessions other than those reported in detail were devoted as follows: Report of the committee on sales engineering, by Willard E. Freeland, Winchester Repeating Arms Co., New Haven, Conn.; the necessity of the quota for proper sales cost accounting, by Charles P. Staubach, manager Burroughs Adding Machine Co., Newark, N. J.; the application of the principles of scientific management to the office, by William H. Leffingwell, Leffingwell-Ream Co., Chicago and New York; the general control of a business, by John H. Williams, Day & Zimmerman, Philadelphia.

Richard A. Feiss, Joseph & Feiss Co., clothing manufacturer, Cleveland, was elected president of the Taylor Society to succeed Henry S. Dennison, Dennison Mfg. Co., Framingham, Mass. The other officers, newly elected, were: Vice-president, Robert B. Wolf, New York, to succeed Richard A. Feiss; member of the board of directors, Ida M. Tarbell, writer, New York, in place of Daniel M. Bates, Day & Zimmerman, Philadelphia, and L. Herbert Ballou, Walworth Mfg. Co., Boston, in place of Frederic G. Colburn, Bethlehem Shipbuilding Co., Bethlehem, Pa.

The officers who continued in office were: Vice-president, H. K. Hathaway, Finance Building, Philadelphia; managing director, Harlow S. Person, Taylor Society, 29 West Thirty-ninth Street, New York; treasurer, Edward W. Clark, 3rd, E. W. Clark & Co., Philadelphia; members of the board of directors, Ray M. Hudson, Holt Mfg. Co., Peoria, Ill., and J. C. Heckmann, United Drug Co., Boston.

"The Technique of the Appraisal of the Efficiency of an Industry" was presented by C. E. Knoeppel, C. E. Knoeppel & Co., New York. His discussion concerned the report of the committee on elimination of waste in industry of the Federated American Engineering Societies at the instigation of Herbert Hoover. In brief, Mr. Knoeppel said as follows: "We 18 engineers had a paradox on our hands to begin with. Mr. Hoover, on

the one hand, asked for an assay of waste in industry, in a few short months, a task to which a lifetime could be devoted. Mr. Wallace, on the other hand, aided and abetted by Mr. Alford, looked through the dictionary for the one word which should guide our activities and located a most excellent one, 'quantitative.' We gave Mr. Wallace his way.

"I do not believe there was ever a committee of 18 men any stronger and abler than our committee, but this strength constituted our chief weakness, owing to the different schools of thought represented, the individualistic strength of each man and the different experiences and pronounced ideas of the members.

"We realized that we were setting out to appraise that most intangible thing on earth, human reactions. We were not going to assay a mine out-cropping, nor a railroad location, nor analyze a new form of gas. No accepted management and labor terminology exists and few units of weighing or measuring the performance of industry have been developed by engineers in a way to be standardized. We considered the development of a medium of expression and the creation of a yard stick.

"It was felt that if the medical specialist could take that most complex thing on earth, the human body, and diagnose and prescribe, we could well follow the same fundamental plan of assay. If the medical specialist, by confining his attention to certain definite things, can make his examination and diagnosis in a comparatively short time, through proper questioning and observations and tests, we could probably do likewise.

"In developing the questionnaire and evaluation sheet the following fundamentals were our guide: First, waste and not effectiveness was to be assayed, much as one would study a refuse pile to develop a by-product; second, a given practice is not wasteful until a better practice has been developed, therefore theoretical standards of excellence should be ignored; three, waste is the difference between possible attainment and actual performance, between the average practice and the best known practice; fourth, no result is 100 per cent wasteful; fifth, best practice would be 0 per cent waste; sixth, responsibility for the cause was as important to appraise as the cause itself.

Over Fifty Per Cent of Waste Due to Management

"On page 9 of the report there is this statement: 'Over 50 per cent of the responsibility for these wastes can be placed at the door of management and less than 25 per cent at the door of labor; while the amount chargeable to outside contacts is least of all.' Whatever else may be said of the questionnaire and evaluation sheet, the fact remains that a quantitative conclusion, satisfactory to the engineering mind, was the definite result of the assays made, and in itself amply justifies the use of the mechanism developed.

"A banker recently said: 'It is important to have a correct appraisal of your property, but how about your management? After all,' he said, 'it is your management and not your plant and product that we are investing our depositors' money in, for without good management, these are in themselves not productive.' Up to this time investigations have not amounted to all that they should because there has been no way of evaluating causes and responsibilities in definite figures. To say that the efficiency of something is 'about' 60 per cent, while looking wise and mysterious after a hop-skip-and-a-jump through a plant, is guessing, and guessing is unscientific and therefore has no place in an engineer's method of working. To tell me that I am not looking well, when I never felt better, is going to make no impression on me at all, but a definite evaluation showing blood pressure 170, pulse 92 and tem-

Guide Questions for Field Investigators, Paraphrased and Condensed from Field Questionnaire Committee on Waste in Industry

K. Organization

- K 1. Have you an organization chart or its equivalent?
- K 2. Is your organization functionalized or is it built around individual personalities?
- K 3. Are the duties of each executive in your organization written up?
- K 4. Are there standard written instructions for each executive or functionary?
- K 5. Have you a research department that is not devoted wholly or in part to current production problems?
- K 6. Do you keep up-to-date personnel records, particularly with reference to quality and quantity of production?
- K 7. Are your workers selected carefully on basis of interviews, trade and other tests?
- K 10. Do you make a practice of shutting down for inventories, unbalanced production, business fluctuations, etc.?
- K 11. Do you follow up and investigate quits?
- K 12. Do you tabulate and analyze labor turnover by causes?
- K 13. How is wage remuneration determined? Union scale, competitive market, etc.; day work, piece work or other forms of incentive wage?
- K 14. What are the hours of labor per day and week and how and by whom determined?
- K 15. Is yours an open, closed union, preferential union or non-union shop?
- K 16. What form of shop representation have you?
- K 17. During the last 5 years what has been your strike record as to frequency, duration, causes, number affected, etc.?
- K 18. During the last 5 years what has been your stoppage record as to frequency, duration, causes, number affected, etc.? (Stoppages are strikes by sections of workers not sanctioned by union.)
- K 19. Are your industrial relations directed by a competent functional personnel head?
- K 20. What does your accident record show as to the degree of danger of personal injury?
- K 21. To what extent do you carry on personnel service work?
- K 7. Is instruction of your workers in methods and quality given by specialists?
- K 7. Do you apply a policy of systematically developing, advancing and promoting workers and others in your organization?

T. Technical

- T 1. What organized external co-operation do you participate in with your own similar and inter-related industries?
- T 2. Have you an up-to-date staff-made plant lay-out showing location of debts, workplaces, path of work, etc.?
- T 3. Do you maintain an up-to-date equipment inventory showing cost, repairs, depreciation by individual pieces or groups?
- T 4. Are there written standard specifications for equipment for each of the various operations?
- T 5. Is your equipment maintained by a periodic repair inspection made by a separate maintenance department?
- T 6. Are your tools standardized for each of the various operations?
- T 7. What is the extent of variety in product design and construction?
- T 8. Is each process standardized as to work content and method?

U. Utilization

- U 1. Do you establish a progressive budget based on knowledge of your manufacturing capacity and forecasts of your business volume?
- U 2. Is your manufacturing policy to make-and-sell or sell-then-make?
- U 3. Do you compile a record of idle machine-time by amount, cost and causes?
- U 4. Is your planning of work centralized or distributed among a number of shop executives and workers?
- U 5. Does your shop administrative mechanism enable you

[illegible]

to anticipate idleness of machines and workers and provide against it?

- U 6. Is there a work ticket for each work assignment or its equivalent provided in advance and on which elapsed time is recorded by mechanical time stamp?
- U 7. Have you a good current cost system tied in with the financial books?
- U 8. Do you compile a record of idle worker-time by amount, cost and causes?
- U 9. Do you compare production performance with production standards, with reference to worker, job department and equipment?
- U 11. To what extent is purchasing done to standard specifications and does it clear through a purchasing agent?
- U 12. What control exists over receipt, issuance and return of materials?
- U 13. Is material storage convenient of access and arrangement and does it conserve space properly?
- U 14. What types of internal transportation are used?
- U 15. Is raw material subjected to careful examination and tests on receipt?
- U 16. Is there competent independent functionalized inspection of work in process with rigorous quality discipline?
- U 17. Is there competent independent functionalized inspection of finished product?
- U 18. What is the amount and character of inspection equipment?
- U 19. Are there proper performance standards based on careful detailed study and the workers' co-operation?

perature 101, is bound to force me to take medicine and perhaps go to bed, whether I like it or not.

"A joint committee is now at work on management terminology, another is just starting work on standardizing graphic presentation. The waste report says: 'The assays of waste show first, the need of definite and quantitative industrial information on a multitude of points.' Is not this the time to begin a joint society work on perfecting the mechanism of analysis and evaluation which was given to the industrial world by the waste committee? Could not it be a work which would go down in the annals of American engineering as comparable to Mr. Taylor's 'Art of Cutting Metals,' by taking the bunk, the mystery and the false doctrines and practices, out of that most recent of developments—industrial management?"

Report Criticized and Defended

The discussion was occupied by various members of the Taylor Society endeavoring to pick flaws in the waste report and by defense arguments offered by those of the 18 engineers who were present. Only 46 questions (reprinted herewith) of the 260 on the questionnaire were submitted to the audience. Those giving the defense generally claimed that the fault finder would withdraw his statement if he knew all of the 260 questions. L. W. Wallace, chairman of the session and executive secretary Federated American Engineering Societies, and one of the 18 engineers who framed the report, held in his hand a copy of the book, "Waste in Industry." He frequently read passages from the book to meet the objections of the fault finders.

Boyd Fisher claimed that the analysis of waste in industry was subjective rather than objective; that concrete data and conclusions had not been reached. In rebuttal, Mr. Wallace read passages showing that the committee had determined in figures the amount of waste due to such definite causes as accidents, defective vision, strikes, etc. Mr. Fisher admitted that he had not read the book.

Dr. Person declared that a subjective assay was necessary, as only five months were allowed for the work. He stated that the report was a fine example of subjective work. He compared the problems of the 18 engineers to a hypothetical agricultural problem. "Suppose," he said, "a certain tract of land must be surveyed as to its fertility. The objective method would be to cultivate a portion of that land and measure the crops. But that would take time. The subjective method would be to consult expert farmers who had had experience in cultivating similar parcels of land and draw conclusions from their testimony."

E. E. Hunt, secretary Committee on Unemployment, Department of Commerce, Washington, stated that he did not consider this report the bonanza that Mr. Knoepfel made out, but rather only a beginning. Boyd Fisher maintained that the questionnaire was to determine the degree of orthodoxy of a plant to scientific management rather than the amount of waste. He was answered by Morris L. Cooke, consulting engineer, Philadelphia. Howard Scott, consulting engineer, New York, maintained that the questionnaire would bring out the effects of waste, rather than causes of waste.

Hugh Frayne, New York, representative of the American Federation of Labor, said that nobody had mentioned the human waste in industry. The human element prevails in industry all the time, yet nothing is ever allowed for the depreciation of this. We have a different problem in human waste in the United States than in any other country. Most countries are one-race nations. Here there are language handicaps in industry. We need better training of workers and more standardization of training. We must take better care of our children, who, underfed from birth, are mentally dead before they even enter industry.

Changes Made in a Taylor Installation

The paper of Charles F. O'Connor, production manager Universal Winding Co., Providence, was of especial interest because it illustrated a Taylor installation under stress of rush production. His subject was: "Reflections of a Production Manager." An additional

point of interest was the fact that a member of the society, Carl Barth, had installed the system.

The normal method to pursue in installing a Taylor system in a plant is for the engineer introducing the system to take on an assistant, who will become production manager when he leaves. Intercourse between them may continue, but short-sighted business policy does not provide for that continuance. Like all construction work, the period of development has created a superstructure essential to the building, part of which may later be thrown into the discard. Also improved appliances and details of operating technique come into the market—there is always an element of progress which calls for some change.

How is the production manager to be guided at these critical times? How informed of the pitfalls and snares? The office of the Taylor Society should be a center of information, should help the manager find out where he can get the assistance that he needs—information concerning repairs, maintenance of methods and new details and implements of the technique of management.

The writer has found out, during the war and since, that to have operated without scientific management would have been confusion, though many details of scientific management had to be held in abeyance temporarily when speed, and not cost, became the prime consideration. Restoration has been a real problem. The society should accumulate data concerning such lapses and the way in which proper conditions have and may be restored. Such data would help many a manager to check up and set himself right.

The author then offered such data to the Taylor Society. For instance, four years ago route sheets, kept while a lot was in process, were filed in pockets on an inserted sheet in the route sheet books. These books were heavy, awkward, slow to handle, they fell apart and it was difficult for several persons to have access to them at once. Then Mr. O'Connor evolved a visible index route sheet, which is a Rand file laid flat on the table. Using two tables, the company now uses four persons, where 12 were formerly required. In other words, 300 per cent efficiency has been added to the route clerk. Board slips and moves which were formerly kept in pockets in the old style books, are now filed in compartments or drawers built in the tables and are easier to find.

Keppeler Hall, Joseph & Feiss Co., Cleveland, in the discussion, spoke of the importance of a proper cost system. Before we can have a proper cost system we must have a proper classification showing the relation of one department to another, he said. Most cost accountants are helpless—they are handed figures over which they have no control and are asked to predict the future, though they have no influence themselves in production. We must express costs in terms that will indicate where responsibility lies.

Wilfred Lewis, Tabor Mfg. Co., Philadelphia, extolled the Taylor system which has been employed in his plant for 18 years during periods of unprecedented booms and unprecedented depression. Even when the company had a disastrous fire in 1911 and had to move its plant 10 miles, the Taylor system was again installed. The speaker said he would not consider any innovations as the Taylor system had proved adequate for any emergency. It is a great labor-saving device, he maintained.

R. G. Scott, H. H. Franklin Mfg. Co., Syracuse, N. Y., said that Mr. O'Connor's problems fell into two classes: Those that would continue and those that could be eliminated for good. A Taylor installation is nothing more than the groundwork of the principles of management.

Changing the System Is "Monkeying With Dynamite"

Frank Gilbreth, consulting engineer, Montclair, N. J., said that the changing of the Taylor system is serious; that Mr. O'Connor is "monkeying with dynamite." However, he admitted that Mr. Taylor did not know anything about the selection of workers, motion study, or fire protection, and hence his system has to be modified to line up with this added knowledge. Nobody ever did a job right—it could always be improved

on; motion study reveals the possibility of improvement. It is dangerous to change the work of another man, but it often has to be done.

H. K. Hathaway, Finance Building, Philadelphia, consulting engineer, did not approve of Mr. O'Connor's changes. He said that whenever he himself had deviated radically from the Taylor system he had gone wrong. It is not the function of the production manager to make such changes, he maintained. Mr. O'Connor has sacrificed certain advantages of the Taylor system. The tickets won't fall out of the pockets if handled properly; they can be easily found if put in proper order.

Two speakers made the observation that the present period of depression gave the best test for the degree of efficiency of the Taylor system. These were Richard A. Feiss and H. H. Farquhar, Belmont, Mass. The latter drew a chart to show that the system developed during the era of rising prices; it will be interesting to see how it holds up during a falling market. Mr. Feiss said that people talked too much about prewar standards and desired to get back to them. We should formulate standards of to-day, he said.

Combination Routing a Topic of Interest

A paper which aroused a great deal of interest and was thoroughly discussed was that of D. J. Walsh, Jr., Sanderson & Porter, engineers, New York, on "Combination Routing—to Meet the Problem of Small Quantities and Short Operations," presented at the plant managers' session, Dec. 3.

Combination routing, he explained as an attempt to counteract to the greatest possible extent the handicap imposed by small quantities and short operations. It cannot eliminate this handicap, he emphasized, but it modifies it to a degree that is a welcome relief. It is based on the feasibility of combining for short operations two or more batches that may properly be handled separately for longer operations. Likewise, it capitalizes the feasibility of routing in one batch a number of different products that call for essentially the same operating treatment, and are of the same degree of urgency. A useful feature of this sort of combination, he added, is the convenience of routing through the shop together products intended partly for stock and partly for shipment.

A specific case of this type of routing, in operation at the plant of Herrmann, Aukam & Co., Lebanon, Pa., manufacturer of plain and embroidered handkerchiefs, was given in detail. It was begun in 1914, and was said to be operating as smoothly as ever to-day. "At the start," he said, "practically all work available for introduction into the shop was in quantity less than was recognized as providing a desirable job at the principal operations. Time study and general observation determined desirable basic batch quantities for the principal operations for the different main varieties of product. Handling facilities were provided in accordance with these determinations, and these facilities in turn fixed the cardinal principle of the scheme of combination routing.

"The first rule was," he said, "that an element of any combination must be indivisible, and must not exceed the basic batch quantity. It could be any fraction of a batch quantity, and preferably, of course, should be exactly that quantity. Trucks and transportation devices were standardized and subdivided into units containing normally fixed quantities and an effort was made in the routing to make elements of a combination multiples of this normal fixed handling quantity." Time study was used in working out these details.

The permanent identity of any element in a combination was assured by assigning to it an "item" number in the routing, which number appeared on a tag placed on the goods before they left the store-room. This designation appeared in the first instance upon the route sheet which was designed to show simply and graphically the arrangement of the items in different combinations for successive operations, this being done by the route clerk solely for the benefit of the tag-writing clerks. Upon this sheet the route clerk could indicate any desirable combination of items or batches.

The second guiding rule for the route clerk was to

make up full batches, the purpose of which was twofold: To use handling equipment to capacity and to provide a job of decent length at each operation. When the route clerk had indicated the combinations to be made, the tags and forms required were prepared by reference to the route sheet, and the allowed times entered by the time-study department. The routing then passed into the hands of the shop-order-of-work clerk.

As to the benefits of combination routing Mr. Walsh said "It not only cuts down the number of different jobs in the shops and stores, and decreases store-room transactions, but it also diminishes planning room transactions such as balance-sheet, payroll and production record entries. It holds down the volume of current manufacturing orders and route sheets, and generally contributes to an economical consolidation of both records and effort."

Views of various sections of the plant were shown, including route sheet and other forms used in the combination routing system in operation there. A. B. Rich, Dennison Mfg. Co., Framingham, Mass., presided at the session, and Carl G. Barth, consulting engineer, Philadelphia, and H. K. Hathaway, consulting engineer, Philadelphia, led the discussion.

Formula for an Efficient Workman

Boyd Fisher, Lockwood, Greene & Co., Boston, presented a formula for an efficient workman. His courage in attempting such a definite undertaking on such an abstract subject was commended by several who discussed his outline. Though minor changes in his formula were suggested, it was approved in the main by those who attended the session. The formula was in chart form, the following being the main outline:

Efficiency and development of the individual depend on:

A. Ability to work.

I. Mental efficiency.

1. Mental equipment.
2. Assignment.
3. Instruction.
4. Supervision.

II. Physical efficiency.

1. Physical development.
2. Health.
3. Assignment.
4. Plant conditions.
5. Equipment.
6. Material.

Plus B. Willingness to work

I. Conscious will.

1. Discipline.
2. Enthusiasm.

II. Unconscious will.

1. Home conditions.
2. Treatment.
3. Plant conditions.
4. Financial incentives.

(These were divided into many subheads.)

The outstanding features of Mr. Fisher's talk were as follows:

"Lockwood, Greene & Co., managers, feel that whatever the development of machinery and processes, the human being is still the unit of efficiency and that the greatest progress of management will be found in considering the worker, not as an incident to, but as the chief factor of production. Improved methods and machines are considered as devised to help the worker, and when he is kept always in mind there is less danger of neglecting phases of his development and bringing about industrial discord and other social ills. This is the sincere and unprompted view of S. Harold Greene, president of the company. The service department is his creation and one of his chief interests. He depends upon it to secure the greatest efficiency and development of the individual workman.

"The service department, in conference, has devised this formula as representing, to its best present knowledge, all of the factors which regulate the efficiency and development of the individual workman. We do not believe that this chart indicates the relative weight of all factors, nor do we have any special point to make in the way the chart is put together. For instance, 'Enthusiasm' might have been placed over 'Discipline,' under the sub-heading of 'Conscious Will.' So far as we now

recognize them, this chart contains all of the principal items to be taken into consideration but makes no attempt to sub-divide them into all of their ultimate activities in the plant. This is particularly true of the health section. We should be glad to learn of principal divisions which should be included, and which we have overlooked. It is recognized that the choice of terms is open to discussion and that in many cases our own experience or even mere chance has determined the vocabulary.

"There is nothing final in our minds in the apportionment of supervisory responsibilities between the service (personnel) and the production department. In the first place, in the textile industry we do not clearly distinguish between line and staff functions and many things are set down under production in this department which should be consigned to some staff department, such as an engineering or a standards or a methods department. On this chart we wish merely to reassure the operating departments that by including things which they now do, if they are done, in a chart devised by a service department, we do not mean to take over the entire functions of management. There is, of course, another meaning in this division of functions, namely, that all departments work together for the efficiency of the individual, and that neither service nor production nor any other department that might be created to swing some of these duties, can alone produce an efficient workman. To the traditional operating head, the number of things set down as belonging to the service department, comes as a surprise, and he will need to be convinced that fully half the conditions of efficiency of workmen lie outside of his own province.

"Lockwood, Greene & Co. are using this chart as the first step in a personnel audit. It is intended to guide the service and the production departments in making inquiries as to what area of the individual workman's development is being neglected. It seems to us to be particularly practical for use in a traditional industry where such a device as time study or task setting is looked upon with distrust. When new methods are shown in perspective, they do not appear perhaps quite so formidable."

The first to discuss this paper was Meyer Bloomfield, Bloomfield & Bloomfield, Boston, who was introduced as "the first to break ground in vocational education." He stated that this chart should be entitled: "A formula for efficient management." He characterized it as a tragedy that labor does not take a more active part in promoting industrial efficiency. It is not truly scientific management when only one party takes all the initiative for improvement and assumes all of the responsibility. That one party is now management. He said that most of the items on the chart are not in the control of the workman but are in the hands of the management. The carrying out of the items on this chart would mean an efficient management. He expressed hope that the Taylor Society would be instrumental in inspiring labor to take its proper part in initiating industrial efficiency methods.

Dr. A. B. Emmons, 2nd, Harvard Medical School, Boston, was introduced as a "power in health research." He has been in charge of the Harvard mercantile health work for two years and has examined employees and conditions in 24 department stores. Physical examinations in stores are not as prevalent as those in industrial plants. Only the best stores are making them; some are afraid to have such examinations. One of the best stores, employing 3500, reports that indigestion is the main cause of illness which causes absences.

"I fear that Mr. Fisher's outline would make a paternalistic Utopia," stated Miss Nelle Swartz, New York Department of Labor. There are not enough provisions in it for the employee's using of his own initiative, she said.

Having heard from an authority on physical hygiene, it was appropriate to hear from an authority on states of mind. Dr. Frankwood E. Williams, National Committee for Mental Hygiene, New York, emphasized the importance of the proper emotional state of the workman. He said that if the health and brain power of the worker continually increased, that worker's efficiency would not increase proportionately; in other

words, that the factor of emotion would enter in. When making fundamental decisions it is frequently our emotional state that decides; we then rally our intellectual powers to try to defend the stand we have taken. Often a man who has passed all of the vocation tests for a position, falls down when he is in that position. The indigestion cases, mentioned by a previous speaker, are often emotional troubles, not gastric.

Mrs. Frank B. Gilbreth, Montclair, N. J., complimented Mr. Fisher for the good vocabulary of words he had chosen for the chart. She characterized it as a "worth while achievement." Additional remarks were made by Prof. Edward Robinson, department of mechanical engineering, University of Vermont; and E. A. Wilson, a manufacturer of Boston.

Inventory of Coal Stocks

WASHINGTON, Dec. 6.—The steel plants and coke industry of the United States on Nov. 1 had 42 days' supply of coal on hand. This is shown in a report based on an inventory of coal stocks as of the date mentioned taken jointly by the Department of Commerce and the Geological Survey, the total supply at that time being approximately 47,400,000 tons of coal in the hands of consumers, or about 43 days' supply. The supply in the hands of steel interests and coke makers, therefore, was representative of the average. The greatest tonnage was at gas works, which had 87 days' supply. The stocks on hand as of Nov. 1 compare with stocks as high as 63,000,000 tons in the past, according to a statement issued by the Department of Commerce to-day.

The estimated average number of days' supplies in the hands of various consumers are as follows:

Railroads, 29; steel plants and coke industry, 42; other industries, 67; gas works, 87; electric public utility, 54, and coal dealers, 47.

"It must be borne in mind," says the statement, "that these are averages and that many individual industries and dealers are far below the average."

The next inventory will be as of Jan. 1.

Wayne Company Buys Borromite Co. of America

The Wayne Oil Tank & Pump Co., Fort Wayne, Ind., has purchased the Borromite Co. of America, Chicago, for \$500,000. Immediate enlargement of the factory facilities of the Wayne Oil Tank & Pump Co.; erection of an experimental laboratory; absorption of the Warriner Mfg. Co., organized a year ago, and centering of control of the zeolite mines of New Jersey in the Fort Wayne company are among the results of the transaction. As soon as possible the equipment of the Chicago company will be moved to Fort Wayne. Factory buildings will be erected upon the 17-acre tract owned by the Wayne Oil Tank & Pump Co., to house the new industry.

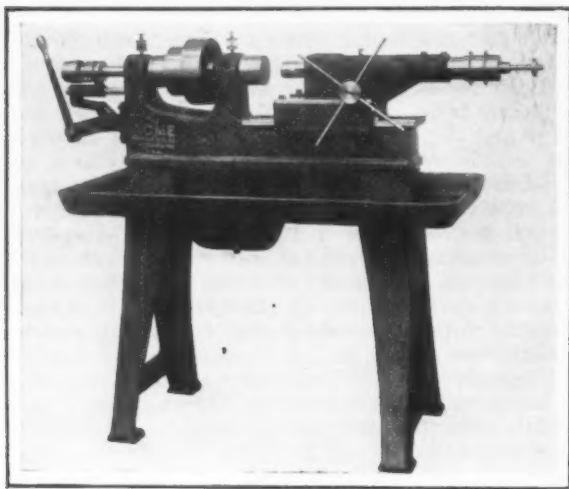
J. E. Patterson, superintendent of the Erie & Ashtabula division of the Pennsylvania Railroad, with headquarters at New Castle, Pa., announces that plans for completion of the Moravia yard directly east of Lawrence Junction at New Castle, are being revised preparatory to important construction operations. Development of the Moravia yard, started in 1913, was halted by the war and has not been renewed since. Repair shops are to be erected. The yard will be an important junction point for coal and ore cars. This development presages industrial expansions at New Castle, it being reported that the Carnegie Steel Co. will erect a by-product coke works at this point.

Nearly three-quarters of the fatal elevator accidents could be prevented if elevators and shaftway doors were equipped with well-designed interlocking devices, a survey and study conducted by the Bureau of Standards of the Department of Commerce has shown. About as many ride on elevators as on all the city traction lines. In providing vertical transportation, an elevator in the Woolworth Building travels about 40 miles a day and makes 4000 stops in that time.

Horizontal High Speed Drilling Machine

The horizontal drilling machine shown in the accompanying illustration is a recent addition to the line of turret machinery manufactured by the Acme Machine Tool Co., Cincinnati. It is especially adapted to drilling small deep holes, such as grease-cup holes in king bolts and similar work requiring quick-acting high-speed drilling.

The design is similar to a hand screw machine in that the spindle and chuck operation are identical. The work is held in the automatic chuck, which is opened and closed by operating the lever at the front head end of the bed. The high-speed drill spindle which takes the place of the standard turret is provided with a No. 1 Morse taper at the front end for holding the drill chuck. The spindle is driven from the countershaft connected by belt to the flange pulley on the



The Work Is Held in the Automatic Chuck. A No. 1 Morse taper in the drill spindle holds the drill chuck

spindle. The entire spindle and pulley are provided with ball bearings, those for the pulley being mounted on a separate stationary sleeve through which the drill spindle passes, a construction intended to relieve the drill spindle proper from belt pull and to allow it to be operated quickly and easily. The spindle is mounted in a separate sleeve which has rack teeth into which meshes the gear on the turnstile shaft. The turnstile handle moves the spindle backward and forward, the stop collar on the spindle's end acting as a stop gage.

The spindle is mounted in a casting block which in turn is mounted on the turret slide saddle, an arrangement which permits locating for long or short pieces, as may be desired. The drill spindle is ordinarily run at approximately 3000 r.p.m., which speed, together with the machine spindle speed of 500, gives a drilling speed of 3500 r.p.m.

New Export Bill of Lading

WASHINGTON, Dec. 6.—Effective Feb. 15, and applicable to all railroads in the country a new uniform through export bill of lading is to be adopted by order of the Interstate Commerce Commission. It is designed to enable shippers in the interior of the United States to forward their freight to a foreign port or to an interior foreign destination. Sweeping aside the jurisdictional questions raised by the railroads, American flag steamship companies and the Shipping Board, the commission said it had the power and laid down the form to be observed where shippers desire to ship on bills of lading that cover the property from point of origin to ultimate destination.

The new form is based on the commission's position that while Congress may not have empowered it to say that American railroads and American flag steamship lines shall enter into an arrangement for transportation on through bills, it did say that when they undertake to so transport, they shall use the form of bill to be prescribed by the commission.

While the railroads, steamship lines and Shipping

Board denied the jurisdiction of the rate-making body, they co-operated with it in formulating the bill to the extent of indicating the terms and conditions which preserved their rights and would not be unreasonable. By reason of this co-operation, the opinion prevails that the bill will be generally used and that there will be no litigation on the subject such as marked the previous effort of the commission to make a uniform through bill.

Eastern States Blast Furnace and Coke Oven Association Meets

Organization of the Eastern States Blast Furnace and Coke Oven Association, comprising blast furnace and coke oven superintendents and operating officials, formed in Pittsburgh last July, was completed at a meeting and dinner held at the Fort Pitt Hotel, Pittsburgh, Thursday evening, Dec. 1. About 70 men active in the operation of blast furnaces and coke oven plants attended the meeting, which was featured by the presentation of papers by Paul O. Menke, superintendent of blast furnaces, Shenango Furnace Co., Sharpsville, Pa., on "The Disintegration of Blast Furnace Linings and the Effect of Zinc on Brick Work," and by Charles R. Meissner, of the Koppers Co., Pittsburgh, on "Methods Now in Use for Testing By-product Coke." The refractories industry was represented at the meeting and H. Koppers, the inventor of the Koppers by-product coke oven, also attended and spoke briefly on by-product plants.

James G. West, Jr., general superintendent, Eliza furnaces; Jones & Laughlin Steel Co., is president of the association, which includes in its membership men from plants as far west as Cleveland and Steubenville, Ohio, and east to Philadelphia. E. H. Colleser, superintendent by-product plant, LaBelle Iron Works, Steubenville, Ohio, is secretary and treasurer. The directors chosen at the meeting are Roy Heffner, superintendent, Rainey-Wood Coke Co., Swedeland, Pa.; George Hohl, superintendent of blast furnaces, Bethlehem Steel Co., Bethlehem, Pa.; H. A. Berg, superintendent of blast furnaces, Midvale Steel & Ordnance Co., Johnstown, Pa.; L. E. Riddle, superintendent, city furnaces, Carnegie Steel Co., Pittsburgh, and George W. Vreeland, superintendent of blast furnaces, Carnegie Steel Co., Mingo, Ohio. The objects of the association are a mutual exchange of ideas, through the presentation of papers on blast furnace and coke plant problems and their discussion. Meetings are not to be held at any stated time, but are to be called from time to time.

Engineering Advertisers of Chicago Publish Monthly Bulletin

The Engineering Advertisers' Association of Chicago is now publishing a monthly bulletin in the interest of its members. The bulletin gives a digest of the speeches made at the various meetings and also includes other information and facts regarding the movement of goods from industry to industry, personal notes, etc. The current copy includes an address by Kenneth Groesbeck, vice-president Harry Porter Co., New York, on "The Baconian Theory of Advertising."

The first issue contains no advertising, but in later editions a small amount of advertising will be accepted, as the board of directors has agreed to devote two pages, divided into ten spaces each, to this publicity. This necessarily will limit the number of advertisers to twenty, and this space is sold merely to meet the cost of publishing.

New York Industrial Engineers to Meet

The St. Lawrence ship channel and power project is the subject selected for the dinner meeting of the New York Chapter of the Society of Industrial Engineers, to be held at the Café Boulevard, New York, Dec. 13. Dr. R. S. MacElwee, formerly director Bureau of Foreign and Domestic Commerce, now director of the School of Foreign Service, Georgetown University, is scheduled to address the meeting on the subject. The address will be illustrated with drawings and maps. General discussion will follow.

Double Helical or Herringbone Gears

Elements of Design to Combine Adequate Strength with Smooth and Continuous Action and a Minimum of Friction of Contact Surfaces

BY HOWARD H. TALBOT.*

IT is the purpose of the following to investigate and study the conditions existing in the action of helical gears, and if possible to establish thereby the principles basic to the best possible design of any double helical gearing. The term "best design" may be detailed as that which offers to the greatest degree the following qualifications:

- Tooth strength commensurate with service,
- Minimum friction of contact surfaces,
- Smoothness or continuity of action.

Obviously, there are the following variables for any pitch diameter: circular pitch, height of tooth, or addendum and dedendum; helical angle; width of face; tooth shape (cycloidal or involute), from which to choose the best combination or proportions. We will eliminate from these variables, in this discussion, the "tooth form" and adopt the 20-deg. involute.

Tooth Strength

Unlike spur teeth (where under certain conditions it is possible to have the tooth pressure applied to the point of the tooth, having a lever arm of practically the tooth depth) in the helical tooth, of proper width of face relative to circular pitch, the lines of contact extend obliquely across the tooth surface from a point at the root, intersecting the pitch line, to a point at the top of the tooth. Thus the average tooth load is applied at the pitch line, and the lever arm A is nearly half that of the spur, indicating a tooth practically twice the strength of a spur tooth. This assumption,

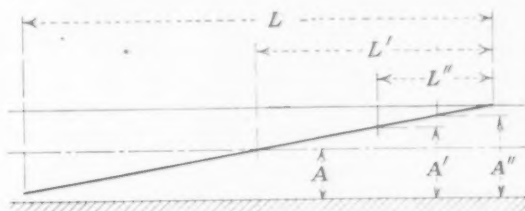


Fig. 1.

however, is not safe or literally true, as for instance—on the section of face L' (Fig. 1) the average leverage is at A' , and for the section L'' is A'' , etc. The point at which we can consider the leverage as applied depends upon the length of face L' or L'' which we can consider relative to the reinforcing effect of adjacent sections of the tooth.

It will not be necessary to develop any theory in this respect, but probably as a matter of strength only, it would be safe to consider a helical tooth approximately one and one-half times as strong as a spur tooth of same tooth section. There is also, of course, the elimination of any shock in the helical tooth, and it is always impossible to theorize in respect to shock.

Friction of Tooth Surfaces

Two problems entering into the reduction of tooth friction are:

To confine the tooth action to that part of the tooth curve nearest the pitch line, where rolling contact, instead of sliding, is obtained.

Friction during the arc of approach is always greater than in the arc of recess, indicating possibly the desirability of decreasing the first and increasing the latter. This might be carried to the point of having arcs of recess only, provided the strength of the tooth

shape and other conditions are not excessively impaired. This, however, would be undesirable, as the portion of dedendum near the pitch line (rolling contact) would be sacrificed, were the pinion to have addendum only. Doubtless there is a ratio of addendum to dedendum which, in relation to other considerations of strength, etc., might be said to give the least practicable amount of friction.

Assume first the usual conditions of equal addenda for pinion and gear, or the arcs of approach and recess equal. By making the addendum and dedendum as short as possible, we can keep the contact area close to the pitch line, or as much as possible within the area of rolling contact. In order, for a given circular pitch, to reduce the addendum to a minimum, it is first necessary to establish an equation of relationship between the addendum and the arc of contact. There are limits of the arc of contact relative to the circular pitch.

Referring to Fig. 2, being a section of any spur or helical pinion normal to the axes: Path of point of con-

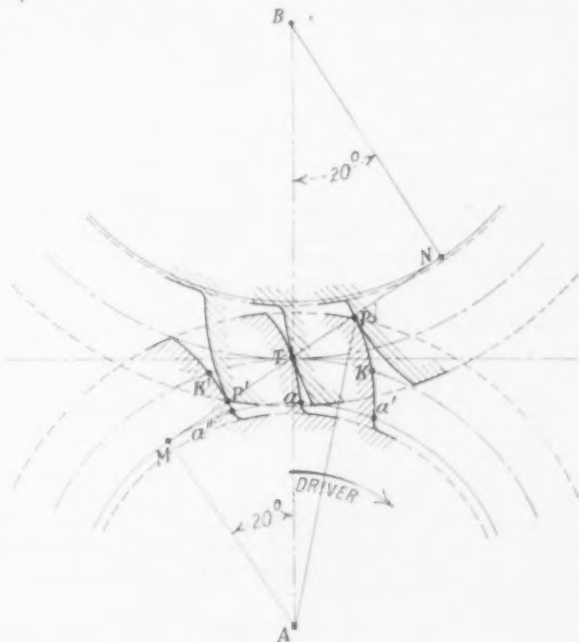


Fig. 2.

tact = $P'P$. $P'T$ = Approach path. TP = Recess path. aa' on base circle $\doteq TP$ and arc of recess (on pitch line) = $TK = TP \times \frac{AT}{AM} = \frac{TP}{\cos 20^\circ}$. Arc of approach = TK' (and aa'' on base circle). $TK' = TP \times \frac{AT}{AM} = \frac{TP}{\cos 20^\circ}$. For gears of equal addenda $TP = TP'$ and $TK = TK'$ or arcs of approach and recess are equal. (See Note A.) Total arc of action = $K'TK$.

In a spur gear, the circular pitch must be less than the arc of action $K'TK$, for continuous motion.

PA = Outside radius.

MA = Base circle radius.

AT = Pitch radius.

$MT = AT \sin 20^\circ$.

$MP = \sqrt{(PA)^2 - (MA)^2}$.

$PT = MP - MT = \sqrt{(PA)^2 - (MA)^2} - AT \sin 20^\circ$.

$TK = TK' = \frac{PT}{\cos 20^\circ} = \frac{\sqrt{(PA)^2 - (MA)^2} - AT \sin 20^\circ}{\cos 20^\circ}$

and $K'TK$ = twice this.

Take a pinion of 20-in. pitch diameter; then $AT =$

*Chief engineer Woodard Machine Co., Wooster, Ohio.

10 in., $AM = AT \cos 20^\circ = 9.397$ in. Now for different values of addendum, AP assumes values shown in Table I. Solving the equation, the values of TK ($=TK'$) and the arc of action ($=TK + T'K$) also appear in Table I.

Addenda	AP	TK	Arc of Action
2 in.	12 in.	4.3 in.	8.6 in.
1½ in.	11½ in.	3.42 in.	6.84 in.
1¼ in.	11¼ in.	2.94 in.	5.88 in.
1 in.	11 in.	2.45 in.	4.9 in.
¾ in.	10¾ in.	1.92 in.	3.84 in.
½ in.	10½ in.	1.34 in.	2.68 in.

If the three tooth curves be considered as located at certain intervals on the face of a helical tooth, the line $P'P$ (Fig. 3) becomes (in projection) the actual line of contact for the instant that the pitch point T

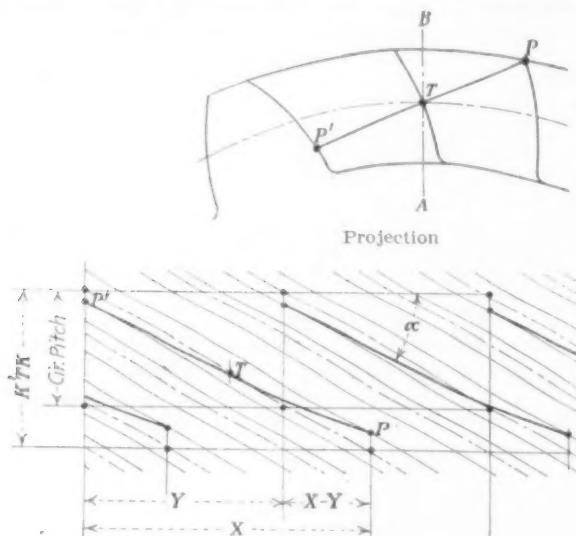


Fig. 3—Developed Plan View

of the middle curve is on the center line AB . Or in plan view (developed) thus, Let X = length of face parallel with axis, covering the line of contact or within which the pitch point traverses the arc of action.

Let Y = length of face parallel with axis, between axially opposite sections of successive teeth, or = length of face in which the helix advances one circular pitch.

If $X = Y$ (then also arc of action = the circular pitch) there will be continuous contact across the face of the pinion at any instant. If Y is greater than X , part of the face is not in contact at any instant, with consequent loss of effective face, (Circular pitch is greater than arc of action).

Unlike the case of the spur gear, where it is impossible to have the circular pitch greater than the arc of action and maintain continuity of action, it is here possible, though undesirable, provided the face is wide enough to insure one complete line of contact and a fraction of a second line.

It is therefore necessary to utilize the full face, that the circular pitch be not greater than the arc of action. It is even desirable that Y be less than X , so that the lines of contact overlap, thus insuring against having any gap.

On this basis therefore (if the circular pitch = the arc of action) the helical angle (α) cannot be greater than 45° , in which case $X = Y = K'TK$.



Fig. 4.

Maintaining $45^\circ = \alpha$, if the circular pitch is less than arc of action, X is greater than Y , and there is overlapping of lines of contact as dotted in Fig. 4.

Also if the circular pitch is less than the arc of action the helical angle may be increased until X again = Y (condition of no overlapping of lines of contact)

to a value α whose tangent is $\frac{K'TK}{X=Y}$ and $K'TK$ is greater than X or Y . The angle α may be increased

until its tangent $= \frac{K'TK}{X}$, so long as X does not become less than Y . If

$$K'TK = \text{circular pitch}, \tan \alpha = \frac{CP}{Y} \text{ and } Y = \frac{CP}{\tan \alpha}$$

$$\tan \alpha = \frac{K'TK}{X} = \frac{CP}{Y} \text{ but } X \text{ must not be less than } Y.$$

Referring to the 20-in. pitch diameter pinion, and the curve for addendum relative to arc of action, and letting $\alpha = 45^\circ$:

Assume eight teeth giving a circular pitch of 7.85 in. The diametral pitch = 0.4, and for standard tooth (spur) we would have an addendum of $\frac{1}{0.4} = 2\frac{1}{2}$ in.

(or, for usual standard stub tooth, $\frac{0.8}{0.4} = 2$ in.)

The pitch normal to the tooth surfaces would be $C.P. \times \cos 45^\circ = 0.707 C.P. = 5.5$ in. To give standard tooth proportion on this section (equiv. D. P. = $\frac{\pi}{5.5} = 0.572$) the addendum would be $\frac{1}{D.P.} = \frac{1}{0.572} = 1.75$ in.

For 1.75 in. addendum, the arc of action is 7.8 in., which is practically equal to the C. P. of 7.85 in. and is the condition for continuous contact across the face of the pinion.

Assume 12 teeth, giving a circular pitch = 5.24 in., and diametral pitch = 0.6. Standard addendum for spur tooth = $\frac{1}{0.6} = 1.67$ in. and for stub $\frac{0.8}{0.6} = 1.33$ in.

Normal pitch = 0.707×5.24 in. = 3.7 in. and equivalent D. P. = 0.85. The addendum would be $\frac{1}{0.85} = 1.18$ in. and from curve the arc of action = 5.65 in., showing overlap.

$$dp = \frac{\pi}{C.P.}, \text{ Equivalent } dp = \frac{\pi}{C.P. \times \cos. \alpha} = \frac{dp}{\cos. \alpha}$$

Assume 16 teeth, circular pitch = 3.93 in. and diametral pitch = 0.8. Standard addendum (spur) = $\frac{1}{0.8} = 1.25$ in.; stub addendum = $\frac{0.8}{0.8} = 1$ in.

Normal pitch = 0.707×3.93 in. = 2.775 in. and equivalent diametral pitch = 1.15. Standard addendum for 1.15 diametral pitch = $\frac{1}{1.15} = 0.87$ in., and from curve, arc of action = 4.35 in., showing overlap.

Assume 20 teeth, circular pitch = 3.1416 in. and diametral pitch = 1. Standard addendum (spur) = $\frac{1}{1} = 1$ in.; stub addendum = $\frac{0.8}{1} = 0.8$ in.

Normal pitch = 0.707×3.1416 in. = 2.22 in. and equivalent diametral pitch = 1.415. Standard addendum for 1.415 diametral pitch = $\frac{1}{1.415} = 0.707$ in., and from curve, the arc of action = 3.65 in., showing overlap.

Assume 30 teeth, circular pitch = 2.092 in. and diametral pitch = 1.5. Standard addendum = 0.667 in.; stub addendum = $\frac{0.8}{1.5} = 0.533$ in.

Normal pitch = 0.707×3.93 in. = 2.775 in. and equivalent diametral pitch = 2.12. Standard addendum for 2.12 diametral pitch = $\frac{1}{2.12} = 0.47$ in., and from curve the arc of action = 2.5 in., showing overlap.

Table II—Elements of 20-In. Pitch Diameter Pinion or Gear, with 45-Degree Spiral Angle

	Number of Teeth				
	8	12	16	20	30
1—Diametral pitch	0.4	0.6	0.8	1.0	1.5
2—Circular pitch	7.85 in.	5.24 in.	3.93 in.	3.14 in.	2.09 in.
3—Standard addendum ($\frac{1}{D.P.}$)	2.5 in.	1.67 in.	1.25 in.	1.0 in.	0.67 in.
4—Stub addendum ($\frac{0.8}{D.P.}$)	2.0 in.	1.33 in.	1.0 in.	0.8 in.	0.53 in.
5—Normal circular pitch	5.5 in.	3.7 in.	2.77 in.	2.22 in.	1.48 in.
6—Equivalent diametral pitch	0.572	0.85	1.15	1.415	2.12
7—Standard addendum*	1.75 in.	1.18 in.	0.87 in.	0.707 in.	0.47 in.
8—Arc of action* (= X)	7.8 in.	5.65 in.	4.35 in.	3.65 in.	2.5 in.
9—Y	7.85 in.	5.24 in.	3.93 in.	3.14 in.	2.09 in.
10—Overlap (X—Y)	—0.05 in.†	0.41 in.	0.42 in.	0.51 in.	0.41 in.

*From curve 1, Fig. 5. †Loss of face.

X = $K'TK \times \cotan \alpha$; for $45^\circ = K'TK \times 1$.

Y = $CP \times \cotan \alpha$; for $45^\circ = CP \times 1$.

In Table II is shown the resulting relation between the circular pitch and the addenda of line 7, which addenda give standard tooth proportions on a section normal to the tooth face, or at 45 deg. with the axis of the gear.

Comparison of curves 1 and 2 shows that the use of standard tooth proportions on this normal section give addenda (for the range up to 7.8 in. circular pitch, slightly greater than necessary, if it is desired only that lines of action on the successive teeth have no overlap, and also no gap, across the gear face, or, in other words, if the circular pitch is maintained equal to the arc of action, as shown by curve 1.

Some overlap is desirable rather than otherwise, so the use of standard tooth proportions on normal section is indicated as being about right for 45 deg.

Changes with Decreasing Spiral Angle

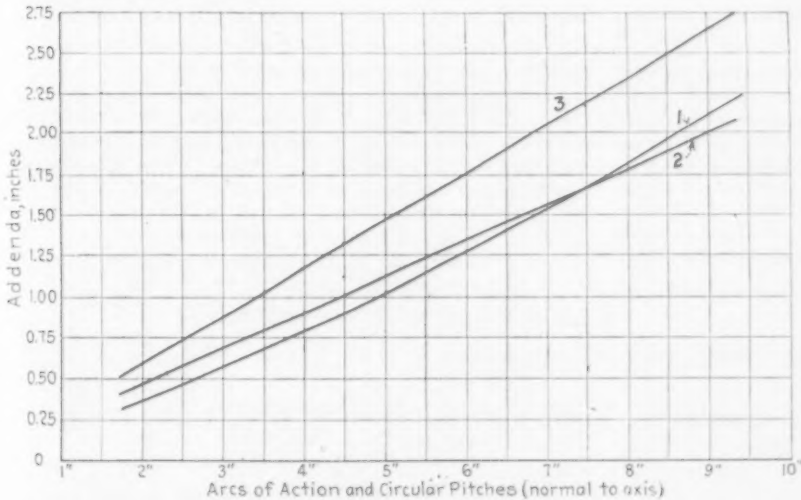
In like manner, let us investigate conditions if a spiral angle of 23 deg. is used, $\alpha = 23$ deg.

Assume 8 teeth, circular pitch = 7.85 in., diametral pitch = 0.4, standard addendum = $2\frac{1}{2}$ in. Usual stub addendum = 2 in., all as before.

The pitch normal to the tooth surfaces would be Circular pitch $\times \cos. 23^\circ = 7.85 \text{ in.} \times 0.92 = 7.22 \text{ in.}$

Equivalent diameter pitch = $\frac{\pi}{7.22} = 0.435$, and standard addendum = $\frac{1}{0.435} = 2.3 \text{ in.}$

And from curve 1 the arc of action = 9.5 in., showing considerable overlap.



Where X = length of face parallel with axis over which line of contact extends on a tooth surface (See Fig. 3) X = arc of action $\times \cot \alpha$.

Distance Y = distance across face between like points on successive teeth:

$Y = CP \times \cot \alpha$

And, in this case,

$X = 9.5 \text{ in.} \times 2.355 = 22.4 \text{ in.}$

$Y = 7.85 \text{ in.} \times 2.355 = 18.5 \text{ in.}$

$X - Y = 3.9 \text{ in. overlap across face.}$

Table III—Elements of 20-In. Pitch Diameter Pinion or Gear, with 23-Degree Spiral Angle

	Number of Teeth				
	8	12	16	20	30
1—Circular pitch...	7.85 in.	5.24 in.	3.93 in.	3.14 in.	2.09 in.
2—Normal circular pitch	7.22 in.	4.83 in.	3.61 in.	2.89 in.	1.92 in.
3—Equivalent diametral pitch...	0.435	0.65	0.87	1.085	1.635
4—Standard addendum	2.3 in.	1.54 in.	1.15 in.	0.92 in.	0.614 in.
5—Arc of action*	9.5 in.	6.95 in.	5.5 in.	4.55 in.	3.22 in.
6— X	22.4 in.	16.35 in.	12.92 in.	10.7 in.	7.53 in.
7— Y	18.5 in.	12.3 in.	9.25 in.	7.4 in.	4.92 in.
8—Overlap ($X - Y$)	3.9 in.	4.05 in.	3.67 in.	3.3 in.	2.66 in.

*From curve 1, Fig. 5.

It therefore appears that in using standard tooth proportions for the section of tooth normal to the tooth surface, we have a larger tooth section for the 23 deg. angle than the 45 deg., as of course is evident from casual inspection.

It also appears that while, in the 45 deg. angle tooth so proportioned, we have contact lines with practically

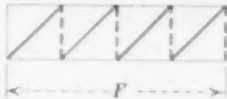


Fig. 6.

no overlap, or the sum of the projected lines of contact; X = the face (about) or $\Sigma x = F +$

$\frac{F}{Y}$ = Number of lines of contact across the face.

$\frac{Fx}{Y} = \left(\frac{\text{length of total projected line of contact}}{\text{length of line of contact}} \right) = \Sigma x$ for given face F .

With the 23 deg. angle tooth so proportioned, we have considerable overlap. This of course is due to the greater length of addendum, and the resulting greater arc of contact for the same circular pitch.

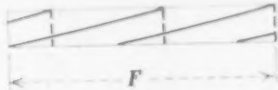


Fig. 7.

Now let us reduce the addenda to the same values as used for the 45 deg. angle tooth, giving the same arcs of action, and an extremely stubbed tooth section

Fig. 5 Shows (1) Arc of Action in Inches on Pitch Line vs. Addendum for 20-deg. Involute Pinion of 20-in. Pitch Diameter; (2) Circular Pitch vs. Standard Addendum for $\alpha = 45$ deg. and (3) for $\alpha = 23$ deg.

normal to the tooth surface, and make comparisons in Table IV.

	Number of Teeth				
	8	12	16	20	30
1—Circular pitch...	7.85 in.	5.24 in.	3.93 in.	3.14 in.	2.09 in.
2—Normal circular pitch	7.22 in.	4.83 in.	3.61 in.	2.89 in.	1.92 in.
3—Addendum	1.75 in.	1.18 in.	0.87 in.	0.707 in.	0.47 in.
4—Arc of action...	7.8 in.	5.65 in.	4.35 in.	3.65 in.	2.5 in.
5— X	18.32 in.	13.30 in.	10.22 in.	8.6 in.	5.9 in.
6— Y	18.5 in.	12.33 in.	9.26 in.	7.4 in.	4.9 in.
7—Overlap ($X - Y$)	-0.18 in.	0.97 in.	0.96 in.	1.2 in.	1.0 in.
Line 5 = line 4 $\times \cot 23$ deg.					
Line 6 = line 1 $\times \cot 23$ deg.					

Let us take the 16-tooth pinion in each case and assume a face $F = 4 \times CP = 4 \times 3.93 \text{ in.} = 15.72 \text{ in.}$ (Considering single helical pinion or $\frac{1}{2}$ double helical.) or say $F = 16 \text{ in.}$

Then:

	45 Deg.	23 Deg.
Y	3.93 in.	9.26 in.
X	4.35 in.	10.22 in.
F		
$\frac{Y}{F}$	4.07 in.	1.73 in.
$\frac{Fx}{Y}$		
$\frac{Y}{F}$	17.7 in.	17.7 in.

As we should expect, for the same arcs of contact, same pitch and same addendum, the lengths of contact surface across the face $\frac{Fx}{Y}$ are equal in each case, but, with the 45 deg. there are 4.07 lines of contact or 4.07

teeth in contact, while in the 23 deg. there are 1.73 only.

Let us compare the tooth forms on sections normal to the tooth surfaces. α is the helical angle on the pitch cylinder of the pitch line. Due to the different

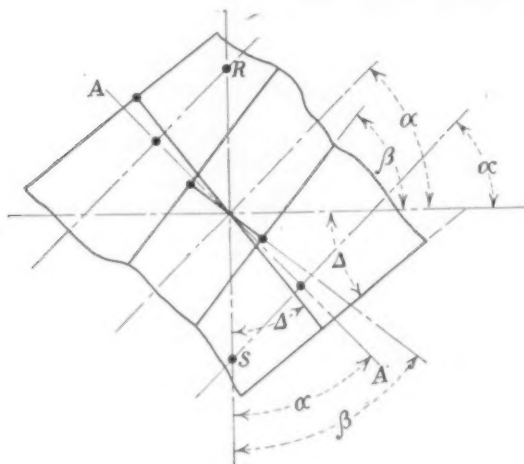


Fig. 8.

radii of the outside, pitch and root of any tooth, it is evident that the respective helical angles of the tooth point line, the pitch line and the root line, with respect to the axis vary.

If α = helical angle of pitch line.
 β = helical angle of point line.
 Δ = helical angle of root line.
 β is greater than α ,
and Δ is less than α .

Therefore, a section across the tooth normal to the elements of the surface is a warped surface. It will, however, be sufficient for our purposes to assume AA normal to the pitch line elements. RS = the circular pitch $\div 2$ = thickness of tooth on pitch line normal to axis.

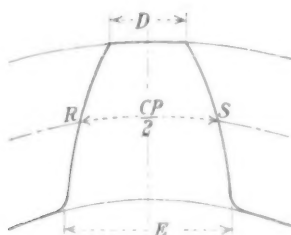


Fig. 9.

Let D = thickness of point.
 E = thickness of root.
And corresponding dimensions on section
AA = $R'S'$, D' and E' .

$$D' = D \cos \alpha.$$

$$R'S' = RS \cos \alpha.$$

$$E' = E \cos \alpha.$$

$$\text{For } \alpha = 45 \text{ deg., } \cos \alpha = 0.707.$$

$$\text{For } \alpha = 23 \text{ deg., } \cos \alpha = 0.92.$$

Thus values of D' , $R'S'$, E' for 45 deg. and 23 deg. vary as the cosines of the angles, and values for 23 deg. = $\frac{0.92}{0.707}$ = 1.3 times values for 45 deg.

For example of 16-tooth pinion, circular pitch = 3.93 in.; scaled from tooth layout we have (Fig. 10)

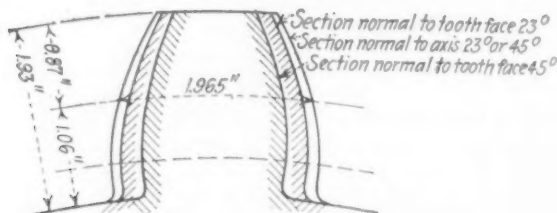


Fig. 10.

the section of 23 deg. tooth stronger than 45 deg. tooth section for equal addenda and equal circular pitch.

The section for 45 deg. tooth is, however, of ordinary standard tooth proportion, addendum = $\frac{1}{dp}$.

Tooth Pressures

Let P = total tooth pressure on a spur tooth.

Let p = corresponding pressure per infinitesimal unit width of face x (Fig. 11.)

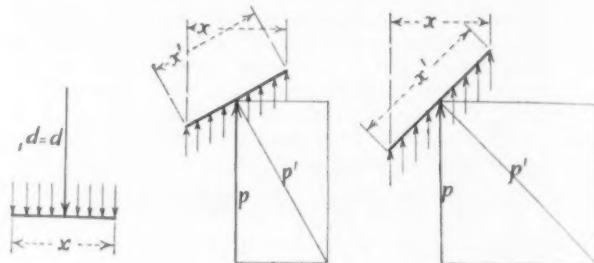


Fig. 11.

p' = resultant pressure normal to the tooth surface.

For the spur $p' = p$.

For the 23 deg. helical $p' = p \sec. 23 \text{ deg.} = 1.086 p$.

For the 45 deg. helical $p' = p \sec. 45 \text{ deg.} = 1.414 p$.

However, the unit face, against which the pressure p' is applied, has also increased to a value x' .

Where $x' = x \sec. 23 \text{ deg.}$ and $x \sec. 45 \text{ deg.}$ respectively

$$= 1.086 x \text{ and } 1.414 x.$$

So the pressure per original unit of face x remains constant in all cases. Therefore, the angle of the helix has no effect on the bearing pressure against the tooth surface per unit length of contact line.

From the above it would seem that, for a given circular pitch and for any helical angle, the minimum addendum which will give the conditions of the minimum required overlapping of the contact lines of successive teeth across the face, is that which would be standard for a section normal to a 45 deg. tooth, or:

CP = circular pitch normal to axis.

$C'P'$ = circular pitch normal to tooth surfaces.

dp = diametral pitch.

$d'p'$ = equivalent diametral pitch of $C'P'$.

$$\text{Addendum} = \frac{1}{d'p'} = \frac{C'P'}{\pi} = \frac{CP \cos 45^\circ}{\pi} = \frac{0.707 CP}{\pi}$$

$$\text{And } CP = \frac{\pi}{dp} \text{ Then addendum} = \frac{0.707\pi}{\pi dp} = \frac{0.707}{dp}$$

Face Relative to Helical Angle

Referring to Fig. 3, face for single helical, or $\frac{1}{2}$ of double, should equal at least $1\frac{1}{4} Y$, and since $Y = CP \cot \alpha$, $F = 2.5 CP \cot \alpha$, or more, for double helical.

For the minimum angle of 23 deg. total face would equal about 6 CP for double helical gears.

The selection of width of face and CP , of course, depends on the total tooth pressure and the resulting tooth pressure per inch of effective projected face, parallel to the axis. Considerations of tooth wear determine the allowable pressure per inch of face, rather than strength of the tooth.

Referring to Fig. 5 and the curve for the arc of action vs. addendum for the 20-in. pitch diameter pinion, the question arises, how will this curve apply to pinions of greater or less pitch diameter? Also, will the rule of addendum = $\frac{0.707}{dp}$ give the same proportionate conditions of overlap, etc., brought out in the above discussion?

Say we have a 40 in. pitch diameter pinion with 16 teeth, or a diametral pitch of 0.4, and the same addendum of $1\frac{1}{4}$ in. The arc of action in this case, figured from the formula, is 8.75 in. Here are the same proportionate conditions as we had in a 20-in. pitch diameter pinion having 16 teeth, where the arc of action was 4.35 in., and it will be noted that the two arcs are proportionate to the pitch diameter. The rule, therefore, based on this curve, becomes:

The arc of action for any pitch diameter and any number of teeth is equal to that of the 20-in. pinion for

the same number of teeth and standard addendum, multiplied by the ratio of the pitch diameters.

Or: Required arc of action =

$$\left\{ \begin{array}{l} \text{arc for 20 in. pitch diameter} \\ \text{for same number of teeth} \\ \text{and addendum} = \frac{0.707}{dp} \end{array} \right\} \times \frac{pd}{20} \quad (1)$$

Conditions of overlap of contact surfaces (i.e. X, Y and X—Y) will be a like proportion of that for the same number of teeth on the 20-in. pitch diameter, namely, $\frac{pd}{20}$, or $\frac{dp}{DP}$. Or,

The arcs vary inversely as the diametral pitches (2)

Let DP = diametral pitch of gear being considered.

Let ARC = arc of action of gear being considered.

Let dp = diametral pitch for 20 in. pitch diameter for same number of teeth.

Let arc = arc of action for 20 in. pitch diameter for same number of teeth.

$$\text{Then (1) } ARC = \text{arc} \times \frac{pd}{20}$$

$$\text{or (2) } ARC = \text{arc} \times \frac{dp}{DP}$$

The foregoing denotes, then, the proportion of helical or double helical teeth, where addenda of pinions and gears are equal, or where the arcs of approach and recess are equal, which will give the minimum height of tooth, and, therefore, restrict the contact surfaces of the tooth curve to the maximum degree to that portion nearest the pitch line, where rolling contact exists. In other words, the portions of tooth curve subjected to sliding contact are reduced to the practical minimum. The condition of minimum practical friction is thus established.

Note A

In the foregoing arcs of approach and recess have been assumed equal for all gear ratios, while as a matter of fact this is true only for gears of 1:1 ratio, or where the pitch diameters are equal.

Referring to Fig. 12:

$$TN = BT \sin 20^\circ$$

$$\text{also } P'T = P'N - TN =$$

$$\sqrt{(P'B')^2 - (BN')^2} - BT \sin 20^\circ$$

and for gears of equal pitch diameters,

$$AT = BT, BN = AM, P'B = PA$$

therefore $PT = PT'$, arcs of approach and recess are equal, and $TK = TK'$.

For larger gear—

$$TN' = B'T \sin 20^\circ$$

$$\text{and } P''T = P''N' - TN' =$$

$$\sqrt{(P'B')^2 - (B'N')^2} - B'T \sin 20^\circ$$

$$TK'' = \frac{P''T}{\cos 20^\circ} = \frac{\sqrt{(P'B')^2 - (B'N')^2} - B'T \sin 20^\circ}{\cos 20^\circ}$$

Using the 20 in. pinion of Table II with addenda of line 7, the arcs of recess KT will be $\frac{1}{2}$ the arcs of action given in line 8. Let us figure the arcs of approach TK'' for gears of various ratios.

Table V

	Number of Teeth				
	8	12	16	20	30
1—Diametral pitch	0.4	0.6	0.8	1.0	1.5
2—Arc recess (KT)	3.9 in.	2.82 in.	2.17 in.	1.82 in.	1.25 in.
3—Arc of action from Table II*	7.8 in.	5.65 in.	4.35 in.	3.65 in.	2.5 in.
4— TK'' 3 to 1 Ratio:	4.75 in.	3.26 in.	2.47 in.	2.03 in.	1.38 in.
5—Total arc†	8.65 in.	6.08 in.	4.64 in.	3.85 in.	2.63 in.
6—Ratio of (5) to (3)	1.11	1.075	1.065	1.055	1.05
7— TK'' 6 to 1 Ratio:	4.96 in.	3.44 in.	2.57 in.	2.11 in.	1.42 in.
8—Total arc†	8.86 in.	6.26 in.	4.74 in.	3.93 in.	2.67 in.
9—Ratio of (8) to (3)	1.135	1.11	1.09	1.075	1.07
10— TK'' 12 to 1 Ratio:	5.19 in.	3.54 in.	2.64 in.	2.15 in.	1.45 in.
11—Total arc†	9.09 in.	6.36 in.	4.81 in.	3.97 in.	2.7 in.
12—Ratio of (11) to (3)	1.165	1.125	1.105	1.09	1.08

*Being the arc for a ratio of 1 to 1.

†Total arc = $KT + TK''$.

For 3 to 1 ratio, $B'T = 30$ in.; for 6 to 1, 60 in.; for 12 to 1, 120 in.

Due to the increase in the arcs of approach as the ratio of gearing is increased, the total arcs of action increase somewhat, as indicated by these percentages. This means that, in the higher ratios, there would be

a proportionately greater amount of overlap across the face for teeth, based on the proportions set out in the above discussion, than there considered. This is desirable rather than otherwise. Should the designer wish in any particular instance he could reduce the addendum until the arc of action approximates more closely the circular pitch.

It will be evident, however, that for any standard, for tooth proportions, to be of standardizing value, it should apply to gears of any ratio. The proportions above developed, addendum = $\frac{0.707}{dp}$, which is based on the condition of shortest arc of action or 1:1 ratio, applies as well to the higher ratios, with a slight desirable increase in face contact. It therefore fulfills the requirements of a standard.

(To be concluded)

More Steel Workers Employed

WASHINGTON, Dec. 6.—The iron and steel industry showed an increase in employment in November of 2.2 per cent, equivalent to 7284 workmen, when compared with October, according to the monthly report of the United States Employment Service. In metal and metal products there was an increase of 0.1 per cent, representing 80 workmen. Other industrial classifications showing increases were paper and printing, 4.2 per cent; lumber and its manufacture, 4 per cent; vehicles for land transportation, 2.7 per cent; tobacco manufactures, 2.2 per cent; chemicals and allied production, 1.3 per cent; stone clay and glass, 0.39 per cent; textiles and other products, 0.2 per cent. The total increases in nine industries was 17,144 workmen. Decreases in the remaining five industries amounted to 9925, so that the net gain was 7219, or 0.46 per cent. Industries showing decreases were liquors and beverages, 21.8 per cent; railroad repair shops, 5.6 per cent; food and kindred products, 2 per cent; leather and its finished products, 1.5 per cent, and miscellaneous industries 0.8 per cent.

Among iron and steel centers showing increases were Johnstown, Pa., 0.4 per cent; Pittsburgh, 2.3 per cent; Birmingham, Ala., 1.5 per cent; Buffalo, N. Y., 1.5 per cent; and Cleveland 0.82 per cent.

New York Attorneys Protest Against Patent Office Delays

Protesting against the delay on the part of the Patent Office in granting patents, 75 patent attorneys of New York met last week and passed resolutions calling on Congress for a remedy. The principal speaker was Ex-Commissioner Thomas Ewing, who said that over 57,000 inventions were now lying in the Patent Office awaiting examination. Inventors are compelled to wait years, he said, before they can obtain capital with which to finance their inventions, due to the unwillingness of business men to put money into an invention unprotected by a patent. During this period of unemployment and depression, Congress should do everything in its power to encourage development of new industries.

Congressman Bond, New York, assured the meeting that he would work for the passage of a bill now before the House of Representatives which would increase the number and the salaries of the technical staff of the Patent Office. A committee was appointed to work for the desired improvements.

The Hendee Mfg. Co., Springfield, Mass., motorcycles, is gradually increasing operations. During November the company turned out 1000 machines, leaving on its books orders for 5000. The management is planning to develop its English business, which, up to the war, showed considerable promise.

The Kalman Co., 22 West Monroe Street, Chicago, manufacturer of steel reinforcing bars, will commence the immediate erection of its proposed plant at Youngstown, Ohio, with initial unit to be 120 x 375 ft.

PICKETING RESTRICTED

Supreme Court Says There Must Be No Intimidation or Enforced Discussion

WASHINGTON, Dec. 6.—Speaking through Chief Justice William Howard Taft, the Supreme Court of the United States in a decision handed down yesterday in the case of the American Steel Foundries, petitioner, vs. Tri-City Trades Council, et al., held in substance that "missionaries" in picketing are permissible, but that the line must be drawn at intimidation. The Chief Justice also took up the issue as to whether "interference of a local labor organization by persuasion and appeal to induce a strike against low wages is without lawful excuse and malicious."

"We think not," says the decision. "Labor unions are recognized by the Clayton act as legal when instituted for mutual help and lawfully carrying out their legitimate objects." It was held that where personal rights and privileges are interfered with by the labor pickets the picketing is invalid, but where there is no interference the picketing may be valid, while threats are never lawful. The decision, concurred in in substance by Justice Brandeis and dissented from by Justice Clarke, came up to the Supreme Court on an appeal brought by the American Steel Foundries growing out of a strike at its plant at Granite City, Ill. It reverses the decision of the Circuit Court of Appeals in part and affirms it in part and remands the case to the Federal District Court of Illinois for modification of its decree. Action was brought by the American Steel Foundries in the District Court to prevent injury to its plant by the strike called in an effort to force an increase in wages. The District Court granted an injunction against the defendants on the ground that a strike could not be conducted peacefully and that there was danger of injury to the plant. The Trades Council appealed to the Court of Appeals. The question was raised as to the jurisdiction of the District Court and the scope of the injunction as well as to the sufficiency of the evidence to justify belief that the plant would be injured by the strike. The decision of the district judge was reversed by the Court of Appeals and the last step was an appeal to the Supreme Court.

Picket Line Established

The company, a New Jersey corporation, normally employs about 1600 men at its Granite City plant. The council declared a strike and established a picket line outside of the plant. In the course of the picketing, there were a number of violent assaults, evidence cited by the court said, by picketers upon the employees as they went to and from work.

The company filed a bill in the Circuit Court, Southern District of Illinois, to enjoin the council and a number of individual defendants from continuing the strike. It charged a conspiracy to injure the business of the company by intimidation, violence and other means. The court issued a temporary injunction, preventing further trouble, and later the injunction was made permanent. This restrained the defendants from in any way or manner whatsoever, by use of persuasion, threats or personal injury, interfering with, hindering, obstructing or stopping any person from going to and from his work. In addition, the injunction forbade the defendants from assembling, loitering or congregating in the neighborhood of the plant for the purpose of picketing or maintaining at or near the premises of the company or on the streets leading to the premises any pickets to obstruct the company in the free operation of its plant.

Upon appeal to the Circuit Court of Appeals, the latter struck out the word "persuasion" from the decree and modified the words regarding picketing by adding to them the words "in a threatening or intimidating manner." The case then was appealed to the Supreme Court.

Application of Clayton Act

The Supreme Court, explaining that the case as it relates the picketers involved application of Section 20 of the Clayton act, forbidding an injunction against

peaceful persuasion of others to cease employment, against peaceful picketing and peaceful assembly for a lawful purpose, held that these declarations do not introduce any new principle into the equity jurisprudence of the Federal courts. The decision said they are "merely declaratory of what was the best practice always."

The decision then proceeds:

"If in their attempts at persuasion or communication, those of the labor side adopt methods which, however lawful in their announced purpose, inevitably lead to intimidation and obstruction, then it is the court's duty—and the terms of Section 20 of the Clayton act do not modify this—to limit what the propagandists do as to time, manner and place, so as to prevent infractions of the law and violations of the right of the employees and of the employer for whom they wish to work.

"In going to and from work, men have a right to as free a passage without obstruction as the streets afford, consistent with the rights of others to enjoy the same privilege. We are a social people, and the accosting by one of another in an inoffensive way and an offer by the one to communicate and discuss information with a view to influencing the other's action are not regarded as aggression or a violation of that other's rights. If, however, the offer is declined, as it may rightfully be, then persistence, importunity, following and dogging become unjustifiable annoyance and obstruction which is likely soon to savor of intimidation. From all of this the person sought to be influenced has a right to be free and his employer has a right to have him free."

Chief Justice Taft then points out that under the circumstances it was idle to talk of "peaceful communication" and that the name "picket" indicated a militant purpose "inconsistent with peaceable persuasion." When one or more assaults or disturbances ensued, they characterized the whole campaign, the decision says, "which became effective because of its intimidating character."

Enforced Discussion

"The law does not look with favor on an enforced discussion of the merits of the issue between individuals who wish to work, and groups of those who do not," the decision states, "under conditions which subject the individuals who wish to work to a severe test of their nerve and physical strength and courage."

In making a distinction between peaceful persuasion or communication and unlawful picketing, the court says "each case must turn on its own circumstances."

"We think that the strikers and their sympathizers should be limited to one representative for each point of ingress and egress in the plant or place of business," the Chief Justice continues, "and that all others be enjoined from congregating or loitering at the plant or in the neighboring streets by which access is had to the plant, that such representatives should have the right of observation, communication and persuasion but with special admonition that their communications, arguments and appeals shall not be abusive, libelous, or threatening, and that they shall not approach individuals together but singly. This is not laid down as a rigid rule, but only as one which should apply to this case under the circumstances disclosed by the evidence and which may be varied in other cases."

The decision also points out that the right to combine for a lawful purpose has not in many years been denied by a court and that the strike is a lawful instrument.

A general meeting of the Michigan Foundrymen's Association is to be held in Kalamazoo, Dec. 13. J. Edgar Lee, Challenge Machinery Co., Grand Haven, is president; E. N. Turner, Manistee Iron Works, Manistee, is treasurer, and A. W. Blodgett, Kelsey Building, Grand Rapids, is secretary.

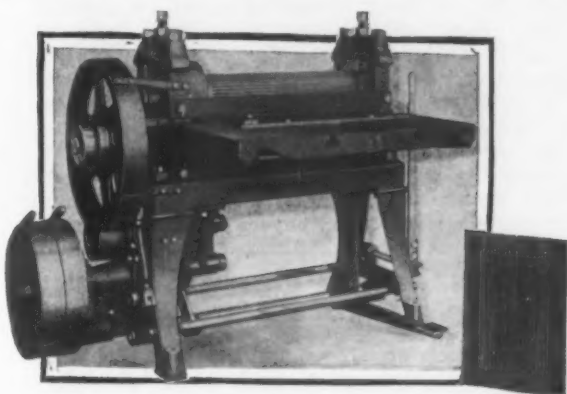
The Republic Iron & Steel Co. again has its plate mill in operation at Youngstown, Ohio, producing plate for large outside diameter pipe.

CORRUGATED ELBOWS

Machinery for Manufacture of One-Piece Elbows, 4 to 8 In. in Diameter and of No. 26 Gage Material

By separating the process into its elements and providing a machine for each operation, the Niagara Machine & Tool Works, Buffalo, is enabled to offer an equipment for the manufacture of one-piece corrugated elbows, including the modern idea of quantity production.

The equipment comprises a squaring shear; corrugating machine; corrugated forming roll; elbow compressor; elbow bending machine, and crimping machine. With the machine units properly grouped the work passes from machine to machine through the complete cycle of operations without lost motion. The equip-



In the First Operation the Sheet Is Corrugated

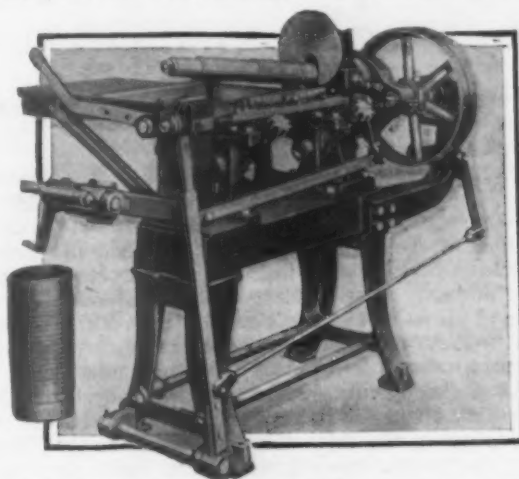
ment is designed to take material of No. 26 gage and lighter, and is said to accommodate without readjustment sheets showing more than an ordinary variation in thickness.

Blank sheets, when not purchased correct as to size, but of the proper width, are squared to size on the shear. The blank is then placed on the table of the corrugating machine against the front and side gages. The treadle is depressed and the sheet automatically feeds between the two corrugating rolls which have recesses for inserting additional corrugations for different sizes of elbows. They produce an offset in the corrugations on one edge of the sheet, thus providing a closer lap joint on the elbow. The corrugating machine is shown in the illustration and the forming roll also. The latter is used for the second operation in which the pipe is formed from the corrugated sheet. The blank is placed on the table of the forming roll, against the side and back gages. The rolls are then closed. A vertical moving slide puts an initial bend in the starting end of the blank. A friction clutch starts the rolls in motion, forming the sheet into a pipe. The machine can be adjusted to various sizes of elbows.

In the third operation the corrugated pipe is compressed on the compressor shown in the illustration. A ring is inserted in each end of the pipe, which is then locked in the mold of the machine, one stroke of which

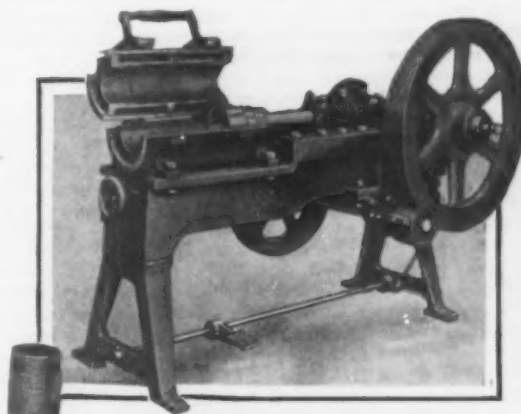
compresses the corrugations. While the compressed pipe is being removed from the mold, the rings are slipped out. The mold is adjustable for various sizes of elbows by means of steel rings, inserts and liners. The amount of compression can also be varied.

Bending the compressed pipe comprises the fourth



The Second Step Is Forming the Pipe from the Corrugated Sheet

operation, the machine for the purpose being shown in the three accompanying illustrations, two of which show the bending operation in detail. The compressed, corrugated pipe is clamped firmly on the chucks of the machine operation of which causes the chucks to form an angle of 90 deg. with each other, opening the corrugations on the outer curve of the elbow and slightly compressing the corrugations on the inner curve or throat, thereby pinching the seams, always placed in the throat, more firmly together. Adjustments and

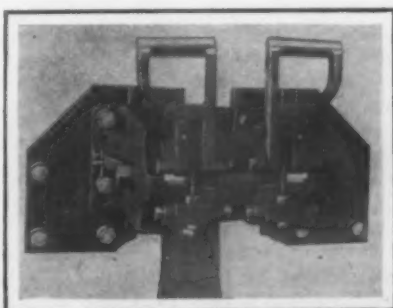
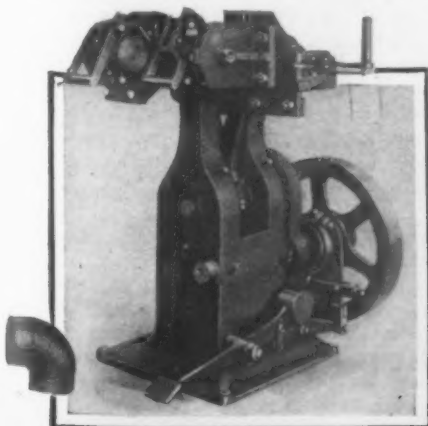


Machine for Compressing the Corrugated Pipe

extra chucks and clamps are provided for various sizes of elbows.

One spot weld is made on each end of the elbow and one end then crimped on the company's No. 7 power bench machine, equipped with crimping rolls.

The four operations can be performed by three operators. The elbows produced are said to be uniform in



The Elbow Bending Machine Used in the Fourth Operation Is Shown at the Left. The bending operation is shown in detail in the two illustrations above, the one at the left being before and the one at the right after the bend

diameter, accurately bent to right angles, with well-rounded backs, tight throat seams and evenly radiating corrugations. It is also claimed that there is no stretching of the metal at the top of the corrugation

which is detrimental to the strength or the breaking of the surface scale that mars the appearance and invites corrosion. The entire equipment may be driven by a 5 hp. motor.

PRICES TOO HIGH

Remarkable Allegations Made by Federal Trade Commission

WASHINGTON, Dec. 6.—Denial by Justice Jennings Bailey, in the Supreme Court of the District of Columbia, of the motion of the Federal Trade Commission to compel coke and iron and steel manufacturers to submit advance sheets in the cost reporting case, has been followed by the filing with the court of an amended answer by the commission. This answer seeks to justify the efforts of the commission to make the manufacturers produce monthly cost reports. Justice Bailey having granted a temporary injunction restraining the commission from securing these facts.

Hearing on the injunction had been set for Thursday of the present week, but has been indefinitely postponed to permit the filing of a reply to the amended answer. In the amended answer, the commission, speaking through its attorneys, Jesse C. Adkins and William T. Chantland, makes sharp comment regarding what it calls profiteering in coal last year, in an attempt to show the public need for the gathering of the data desired.

The commission mentions the unusual decline in prices of agricultural products in an effort to show that steel prices are out of line. In this connection, the answer says:

The results of the information required by the commission are now and will be during the immediate future of particular value to the public generally, to Congress, and to the trade for the reason that, as is common knowledge, price readjustments are at the present time very much out of line and harmony, and prices on steel and steel commodities have declined from the war prices much less than on many other commodities, whereas, prices of many other commodities, notably agricultural commodities, to the producer, have declined down to or below pre-war prices (for example, oats and corn selling in agricultural districts at 20c. and less per bushel), that as a result of the general feeling that the price readjustments in the steel and iron industry are out of line, the people generally have stopped buying, or are buying only as little as possible, and that this has an effect, whether properly or improperly, upon the whole industrial and trade structure, and that it is, therefore, of prime importance that the truth and facts relating thereto be ascertained and made public—not so as to identify results as to any individual concern (and it is not the purpose or intention of the commission to publish facts so as to identify results of individual concerns), but the truth and facts as to the entire industry; and to disseminate such true facts, it is essential and necessary that the commission gather and compile the facts called for in its forms (which activities were temporarily enjoined in this suit).

The amended answer in large measure is a revised compilation of the original answer dealing with the authority of the commission to get the data under Section 6 of the Federal trade act, the manufacturers denying the jurisdiction of the commission. The commission in turn denies that compliance by the producers with orders and answers to its questionnaires will subject them to unnecessary expense and loss in the preparation of reports and in making provisions therefor in their system of accounts. It is further stated that requirements of the commission are not unreasonable or an abuse of discretion.

The claim of the attorneys for the commission that "prices on steel and steel commodities have declined from the war prices much less than on many other commodities" is interesting to say the least. But its accuracy will not stand the test of actual conditions. At the outset, the comparison in the decline between steel and agricultural prices is not considered to be well taken. The drop in agricultural prices has been exceptional and is far from representative. At the same time, the decline in steel prices under so-called

war prices has been distinctly sharp and is much greater than that in many other lines, such as in building materials and in retail prices. The market to-day, as a study of the market shows, is only about 25 per cent above 1913 prices and as the industry is so painfully aware, a large tonnage is being produced at an actual loss, and will continue to be until transportation rates are materially reduced. Therefore, the statement in the commission's amended answer falls far short of truly reflecting the situation. The buyers' strike referred to is a part of a world-wide economic condition prevailing at present through numerous causes, one of which undoubtedly was the inflation of prices, labor and transportation costs, and which existed in all lines. To say that conditions in the steel industry were responsible for this development is taken to be an attempt to draw a conclusion not founded on fact and cannot be on the plea that the steel industry is the barometer of trade. Steel, as is evident, is not a commodity purchased by the average consumer and it was the attitude of the latter in halting purchases that started the so-called buyers' strike.

Estimates Present Pig Iron Production Costs in Three Centers

In an article on "The Manufacture of Pig Iron" in the *Griffin Bulletin* of November, published by the Griffin Wheel Co., Chicago, G. S. Evans, superintendent cupola division, presents estimates of the cost of making pig iron in the three principal producing centers, based upon materials acquired at current market quotations:

	Pittsburgh		Chicago		Birmingham	
	Tons	Value	Tons	Value	Tons	Value
Ore	1.8	\$12.42	1.8	\$10.17	2.7	\$4.89
Limestone	0.4	0.48	0.4	0.48	0.4	0.40
Coke	1.0	4.50	1.0	7.00	1.6	8.00
Mis. supplies and refining		0.81		0.81		0.94
Labor		1.08		1.08		1.35
Cost per gross ton		\$19.29		\$19.54		\$15.58

The Chamberlin-Roome Steel Co.

A new corporation has been organized in Chicago to engage in the merchandising of steel products, to be known as the Chamberlin-Roome Steel Co. The executives are all men who have been identified for a period of years with that district. They include Charles M. Chamberlin, president; William A. Roome, vice-president and treasurer, and Walter D. Monroe, secretary.

The general warehouse of the company is located at Thirty-ninth Street and Ashland Avenue, in the central manufacturing district, which is practically the center of the city, and affords excellent distribution facilities for the local trade and is served by the Chicago Junction Railway for out-of-town shipments. Offices will be maintained both at the warehouse and in the Continental and Commercial National Bank Building. It is the intention of the company to carry a complete stock of bars, bands, hoops, blue, black, and galvanized sheets, rivets, tubes, structural shapes, plates and boiler supplies. Equipment will be installed to permit cutting to length and size, but no provision has been made for fabricating facilities, as it will be the policy of the company to adhere strictly to the merchandising of iron and steel products.

According to a report of the Ford Motor Co., made last week, November production in its American and foreign plants would equal if not exceed that of October. October production was 92,000 automobiles. The Highland Park, Mich., and four other American branches made 85,000 cars, and the Canadian and overseas branch plants made 7000, with the Manchester, Eng., plant leading with 2000 cars.

BUSINESS IMPROVEMENT

Special Activity as Noted by Department of Commerce—Less Unemployment

WASHINGTON, Dec. 7.—Continued improvement in industrial and commercial conditions is shown by figures just published by the Department of Commerce in its monthly *Survey of Current Business*. Greater output of textile products as well as of iron and steel is shown, while a widespread increase in building has made itself felt in lumber, cement, brick and related industries. The department notes further declines in prices in October, but on a much smaller scale than earlier in the year. This relative stability of prices and the improved banking situation, as evidenced by increased reserves, smaller loans and lower interest rates, are considered favorable to further business improvement. The most serious drawback is stated to be the low price of agricultural products and the consequent decreased buying power of the farmers.

Retail prices on Nov. 1 showed no change, and wholesale prices declined slightly. Prices paid to producers for crops and livestock, however, still declined markedly and both groups are below the 1913 level for the first time since the beginning of the war, while wholesale and retail prices are still about 50 per cent above that mark. Wholesale prices in Canada, the United Kingdom and France also declined during October but continued inflation increased the price level in Germany and Italy.

The monthly export trade of the United States for the past six months is greater than in 1913, even making an allowance for an increase of 50 per cent in prices. On that basis, exports are 10 per cent greater than the 1913 average but imports are 10 per cent less.

Unemployment conditions continued to improve in October. Figures for the United States as a whole and for New York State show more men employed and larger payrolls, but average earnings appear to be on the decline. This factor is also reflected in the decline in postal savings. The small excess of immigration over emigration has also helped labor conditions.

Increased buying is reflected by greater sales in October by mail-order houses, and chain stores, greater advertising in magazines and larger postal receipts.

Shipping Steel by Water

PITTSBURGH, Dec. 5.—Interest in the possibility of the inland waterways for delivery of freight in quantity has been greatly quickened through the success of the undertaking by the Jones & Laughlin Steel Co. in use of the rivers for shipment of steel products to Southern and Southwestern consumers. That company already has sent two great fleets of barges, carrying approximately 400 carloads of steel products, south on the Ohio and Mississippi from its works in the Pittsburgh district, and is preparing to continue the service as a regular factor in its distribution system.

The first tow carrying about 100 freight carloads left the Pittsburgh harbor the last week in October and distributed its cargo to Huntington, W. Va., Louisville, Ky., Evansville, Ind., and St. Louis. The second tow, carrying 300 freight carloads of steel products, started down the river this week and will proceed as far as Memphis, Tenn., unloading parts of its cargo at several intermediate points.

The use of the river system for delivery of its products was undertaken by the Jones & Laughlin Steel Co. primarily to avoid the present excessive freight rates, but has been so successful that, according to company officials, it is now the intention to make it a permanent service for a wider distribution of the products of its mills. Not only is the company planning an increased use of the inland waterways system, but is looking into the possibility of the use of sea-going steel barges for delivery of steel products to Gulf points and also in time to ports on the Pacific Coast through the Panama Canal.

The two Jones & Laughlin tows which have gone

down from Pittsburgh have been composed of 200-foot steel barges belonging to the Vesta Coal Co., a subsidiary of the steel company. The first tow, feeling its way along, reached St. Louis in 14 days, as against an average of nine days by rail, but the second tow is expected to clip the time down close to rail delivery time, and it is the expectation of the company to be able eventually to make even better time than by rail.

Research on Molding Sand

An announcement by Alfred D. Flinn, chairman, Division of Engineering, National Research Council, is as follows:

Hundreds of thousands of tons of molding and core sands are used annually in the iron, steel and non-ferrous foundries of America. A little of it is re-used; much more might be. Sands are not always correctly selected for specific purposes. Mixing and other treatment can secure improvement. In what ways can foundry practice as to sands be bettered? What economies can be realized, not only in reduced expenditure for sand, but also in less number of lost castings and higher quality of accepted product?

Last Spring, the American Foundrymen's Association decided that thorough study of this subject would be profitable and asked the co-operation of the American Institute of Mining and Metallurgical Engineers.

The institute referred this request to the Division of Engineering of the National Research Council, of which it is a member. Through joint action with the division, a valuable digest of the literature has been made by Prof. Robert E. Kennedy, of the University of Illinois, and a large committee of foundrymen, engineers and scientists has been selected, under the general direction of President W. R. Bean, of the Foundrymen's Association and the chairman of the division.

This committee on molding sand research has just been organized with the following officers and executive committee:

Chairman: R. A. Bull, consulting engineer, Sewickley, Pa.
 Secretary: Robert E. Kennedy, assistant secretary American Foundrymen's Association, 909 W. California Street, Urbana, Ill.
 W. R. Bean, president American Foundrymen's Association, Naugatuck, Conn.
 Henry B. Hanley, metallurgist and chemist, 107 Ocean Avenue, New London, Conn.
 Jesse L. Jones, metallurgist, Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.
 Prof. Henry Ries, geology department, Cornell University, Ithaca, N. Y.
 Dr. Bradley Stoughton, consulting engineer, 10 East Forty-fourth Street, New York City.
 Dr. George K. Burgess, chief division of metallurgy, Bureau of Standards, Washington, D. C.

The committee has 35 members, representing the many interests in the use of molding sand.

At a meeting of the executive committee, Nov. 26, in the office of division of engineering, Engineering Societies Building, New York, three sub-committees were appointed to deal, (1) with the formulation of standard tests for determining the working properties of molding sand, (2) reclamation of molding sands and greater use of old sands, and (3) methods of manufacturing synthetic sands. A meeting of the main committee will be held in the Engineering Societies Building, 29 West 39th Street, New York, on Dec. 9, to lay out a comprehensive program of research which will include the assigning of the various problems to appropriate laboratories and industrial plants. Some field work will be necessary in connection with these investigations.

The co-operation of men having like interests in Canada and England is assured and invitations have been extended to France and Belgium.

The Pittsburgh Boiler & Machine Co., Pittsburgh, Kan., has just completed a two story fireproof construction pattern shop and storage. It is also contemplating improvements and building for after Jan. 1.

Railroads Gain by Labor Board Decision

Working Rules for Shop Crafts Made More Elastic and Give Recognition to Non-Union Workers—New Regulations Mean Saving to Carriers of \$50,000,000 Annually

— BY G. L. LACHER —

CHICAGO, Dec. 3.—A decision announced here this week by the United States Railroad Labor Board will mean a saving to the railroads of the country estimated at \$50,000,000. The announcement of the board completes the work of that body in revising the working rules of railroad shop crafts. The attention of the board was confined to the revision of rules on which the railroads and employees failed to come to an agreement. The revised regulations as now published include rules which were approved by the board and made effective Aug. 16, additional revisions which became effective Oct. 16, and the remaining changes which were put into effect on Dec. 1.

Although the new rules are far more elastic than those included in the National agreement which was framed under the Railroad Administration, the principle of collective bargaining and union recognition was not abandoned. The recommendations of local shop committees are still to be heeded when vacancies are to be filled by promotion. The local committees are also authorized to present the cases of individual employees who believe they have grievances against the management. An important addition to the rules, however, is a specific provision authorizing employees who are not members of the shop crafts organizations to present grievances in person or by representatives of their own choice. This clause has been interpreted in some quarters as establishing an open shop. From a practical point of view, however, so long as the majority of the employees are unionized, negotiations between the men and the management will continue to be handled by union representatives.

Broaden Scope of Work

The new regulations are chiefly significant because they increase the authority of the management and broaden the scope of the work of the individual crafts. Under the old regulations, no employee who was in the service of the railroad 30 days could be discharged for any cause without first being given an investigation. Under the new rules, an employee may be suspended pending a hearing and if it be subsequently found that he has been unjustly suspended or dismissed from the service, he shall be reinstated with seniority rights unimpaired and compensated for the wage loss, if any, resulting from his absence from service.

One of the principal objections of the railroads to the National agreement was that it defined the duties of each craft in such minute detail that work not requiring specialized skill was assigned to skilled workmen, and employees were not permitted to perform duties other than those specified, even though the uninterrupted operation of trains urgently required their help. Under the revised regulations, the definitions of the duties of various crafts have been made far more elastic. Thus, engineers, firemen and cranemen of steam shovels, ditchers, clam-shells, wrecking outfits, pile drivers and other similar equipment requiring repairs on the line of road, are specifically authorized to make such repairs as they are qualified to perform, notwithstanding the fact that such work is normally done by machinists, boilermakers, et al. Similarly it is specified that in running repairs, other mechanics than sheet-metal workers are authorized to remove and replace jackets and connect and disconnect pipes where no repairs are necessary to the jackets and pipes in question.

Under the old rules, a sharp division was made between dead work and running repairs. Craftsmen assigned to running repairs were not required to do dead work at points where dead work forces were

maintained. The new regulations provide that such craftsmen may be put on dead work, even at points where dead work forces are maintained, if there is not sufficient running repair work to keep them busy. Specific provisions in the old rules determining the number of craftsmen and helpers necessary on certain work have been tempered in the revised regulations. Thus the old agreement required that a boilermaker sent out on the road to do boilermakers' work must be accompanied by a helper when such work requires a helper at the home point. The revised regulation merely provides that boilermakers sent out on the road be furnished with a helper *when necessary*.

Transfer to Semi-Skilled Men

Various duties formerly assigned to skilled workers have been transferred to semi-skilled men. Boilermakers' helpers are now assigned the work of removing and replacing grates, which was formerly done exclusively by journeymen boilermakers. Operators of electric traveling cranes with a capacity of 40 tons and over are now classed as linemen instead of as electricians, and operators of cranes of less than 40 tons capacity come under the classification of groundmen instead of linemen, as formerly. Work on storage batteries, formerly assigned exclusively to electricians, is now to be divided between electricians and helpers as may be agreed upon locally.

Under the original National agreement, carmen exclusively were assigned to wrecking crews. As revised, the rule provides that, when needed, men of any class may be taken as additional members of wrecking crews to perform duties consistent with their classification.

Throughout the revised regulations, the divisions of duty as between crafts have been made less rigid, so that time will not be lost because the proper craftsmen are not immediately available and workmen will not be in idleness because there is not sufficient work coming within the scope of their specified duties to keep them busy.

Reduction of Forces

Reduction of working forces has been facilitated under the revised regulations. Under the old agreement, there was no provision for a reduction of working hours and five days' notice had to be given men before they could be laid off. Under the new rule, hours may be reduced to 40 per week before reducing the force and only 48 hours' notice need be given before such a reduction in hours is effected. On the other hand, when the force is to be reduced, only four days' notice instead of five days need be given the men affected. Whereas the old agreement rigidly provided that senior laid-off men must be given preference in re-employment and returned to their former positions, the new regulation specifies that they shall be returned to their former positions, *if possible*.

An entirely new set of rules promulgated by the board creates a new type of apprentice to be known as a special apprentice. Previously there have been only two kinds of apprentices, regular and helper apprentices. Special apprentices are to be selected from young men between the ages of 18 and 26 who have had a technical school education, and they are to serve only three years' apprenticeship before becoming journeymen mechanics.

Piece Work Permitted

One of the most important changes in the rules was made effective Oct. 16. This was a modification of Rule 1, governing hours of service, to remove all

inhibitions against piece work contained in the original National agreement and to permit the question to be taken up for negotiation on any individual railroad in the manner prescribed by the transportation act. Another important change was made on Aug. 16. Formerly overtime at the rate of time and a half was paid for all Sunday and holiday work. Under the revised rule, employees necessary to the operation of power houses, millwright gangs, heat treating plant, train yard, running repair and inspection forces, who are regularly assigned by bulletin to work on Sundays and holidays, are to be compensated on the same basis as on week days.

Pay for Overtime

Another important change made on Aug. 16, provides that for continuous service after regular working hours, employees shall be paid time and one-half on the actual minute basis with a minimum of one hour for any such service performed. Under the old agreement, the employee received credit for an extra hour of work if his task were not completed until a few minutes had elapsed beyond the even hour.

The employees involved in the decision are included in the six shop crafts: carmen, sheet metal

workers, machinists, blacksmiths, boilermakers, and electrical workers, who were represented at the hearings on the case by the Brotherhood of Railway Carmen of America, the International Alliance of Amalgamated Sheet Metal Workers, the International Association of Machinists, the International Brotherhood of Blacksmiths, Drop Forgers and Helpers of America, the International Brotherhood of Boilermakers, Iron Ship Builders and Helpers of America, and the International Brotherhood of Electrical Workers. All of these organizations are affiliated with the American Federation of Labor and are enrolled in the railway employees' department of that labor organization.

There are two important qualifications to the application of the rules promulgated by the board. It is specified that the rules will not apply in instances where any particular carrier may have agreed with its employees upon any one or more rules, in which case the rules agreed upon shall apply on that road. It is also provided that the present rules are not to be understood or construed as carrying with them the interpretation placed on them by the United States Railroad Administration or any of its agencies.

TO PREVENT WASTE

Heavy Losses in Foundry Practice—Report of the U. S. Bureau of Mines

WASHINGTON, Dec. 6.—In his annual report made public to-day, Director H. Foster Bain, of the United States Bureau of Mines, points out the special efforts of the bureau to aid mineral industries to re-establish themselves on a safe business basis to meet renewed foreign competition and the changed conditions of supply and demand of the postwar period, showing the way to the possible saving of vast sums through the application of improved methods in the production of mineral materials.

An investigation of scrap losses in aluminum-alloy foundry practice showed that the annual losses in the United States amount to \$1,200,000 and that universal adoption of methods recommended by the Bureau of Mines would probably result in a saving of about \$600,000 per annum. Melting losses in this industry, which are largely preventable, aggregate \$3,000,000 yearly.

The bureau investigated the properties and possibilities of molybdenum of which the United States possesses the largest known deposits, although the country is relatively poor in high-grade deposits of some other important alloying elements used in alloy structural steels, such as automobile steels. The bureau conducted studies directed toward devising means for utilizing extensive deposits of low-grade iron ores that can not be smelted profitably by present methods. These studies included investigations of the low-grade iron ores of the Birmingham, Ala., district, the manganiferous iron ores of the Lake Superior district, and the iron and steel situation in the Pacific Coast states.

The cost of production of zinc, with the standard retort process, is now so high that it endangers the position of zinc as a cheap metal. Plans have been formulated for an investigation of proposed methods for the electrothermic metallurgy of zinc, with a view to increasing the recovery of metal and lowering production costs. The results of an investigation regarding the losses of fines in the tailings of zinc metals in the Wisconsin district indicate that the use of concentrating tables of a certain type will greatly increase recovery. It is estimated that this practice would have added about \$1,000,000 annually to the value of zinc output in this district had it been in operation in 1917.

As about one-quarter of the bituminous coal produced in the United States is used in industrial power plants, the waste of unburned coal and coke in the ashes from boiler plants has been investigated by the bureau. It has been possible to recover the greater part of the unburned fuel by washing the ashes on a concentrating table. As the result of a study of coal washing prob-

lems in the State of Washington, one mine has built a table washing plant to treat a pile of refuse amounting to more than 1,000,000 tons, estimated to contain 200,000 tons of recoverable coal of coking quality.

The bureau completed work on preparation and analysis of special alloy steels for the Navy. A comprehensive report on recent developments in electric brass melting was finished.

Improved Prospects in the Northwest

SEATTLE, Nov. 30.—Operators in the iron and steel trade who omit lumber from their future basis as regards sensing coming market conditions will miss a vital point that they may later regret. Mills and wholesalers in the West Coast fir territory, who have struggled through 11 months of leanness unparalleled in the history of the industry are able to report a rising market, unusually heavy buying of wooden parts of cars by Eastern car manufacturers, increasing inquiry for shingles and fir, unusually early for the industry, and symptoms of railway lumber maintenance buying. Inasmuch as steel and hardware follow all these improvements in conditions, lumbermen believe the two industries will be interlocked through the next 90 days in a manner never before known.

The communities of Priest River and Sand Point, Idaho and Newport, Wash., are well started in a movement to span the Pend Oreille River with a \$200,000 concrete and steel toll bridge as an attraction to tourist travel. Citizens have formed the Interstate Toll Bridge Co. with authorized capital stock of \$200,000 which will be subscribed in the communities affected. Dividends of 8 per cent are guaranteed.

Will Need Oil Drilling Machinery

SEATTLE, Dec. 1.—Unprotected by "blue sky" laws, investors in this State have been doubly cautious as regards buying oil development stocks of any kind, but the change in Alaska from gold to oil prospecting seems to have drawn many shrewd financial men of the State of Washington into the excitement, and oil drilling machinery, it is believed, will be in demand in the North next spring. More than 600 applications for oil leasing and prospecting permits have been received at the capital at Juneau. These affect 1,400,000 acres. Almost 50 per cent of the filings are in the Cold Bay region on the Alaska Peninsula. Geologists have reported favorably and drilling is expected to start in the spring.

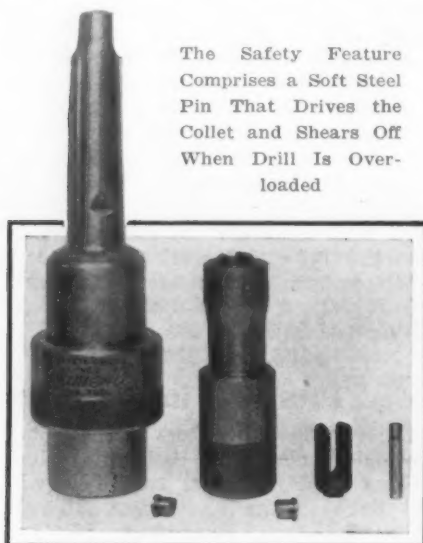
The Massachusetts Department of Labor and Industries reports encouragingly for the past week, having received notices of increased output in large metal and machinery establishments in that State.

Safety Quick Change Drill Chuck

A quick change drill chuck for holding drills with taper shanks, the dimensions and weight of which are practically the same as those of the ordinary quick change drill chuck on the market, yet having new features and known as the SaveAll positive safety quick change drill chuck, has been placed on the market by the SaveAll Tool Co., Waltham, Mass.

The chuck has a safety device intended to prevent drills, taps, reamers, counterbores, etc., from breaking and burning, and which comprises a soft steel pin that drives the collet and shears off when the cutting tool is overloaded. The pin is held in place by a pointed screw which positions in a groove in the pin, and when it is sheared can be removed by loosening the screw and inserting a new pin. Certain sizes of pins are applicable to drills of various diameters; for instance, the same pin is used with 37/64 to 29/32-in. diameter drills.

The drill or other tool is held in a collet which slips



The Safety Feature
Comprises a Soft Steel
Pin That Drives the
Collet and Shears Off
When Drill Is Over-
loaded

into the chuck when the sleeve on the latter is raised. Lowering of the sleeve forces in jaws which engage the collet on the taper end. The collet is made with two diameters, beveled on the outer ends. These bevels pilot the collet into the chuck, the diameters entering a small and a large hole simultaneously, preventing the collet from getting out of line and sticking while being changed. A compensating collet lock for automatically taking up wear and eliminating end motion is provided, as well as a Bristol hollow safety set screw for preventing the tool from pulling out. Tools can be changed while the machine is in motion or at rest.

In the small end of the collet there is an ejector, a light blow on which releases the drill. The chuck shown in the illustration is a No. 2, the capacity of which is 1/4-in. to 2-in. taper shank drills, i.e., Nos. 1, 2, 3 and 4 Morse tapers. The chuck is simple in design, there being but four working parts. With the exception of the shear pin, which is of cold rolled steel, all parts are hardened.

By removing the danger of burning and breaking the drill, the maker claims that an operator is enabled to drill steel at 5 in. to 7 in. per min., and cast iron at 10 in. to 14 in. per min. without danger to the cutting tool. A record submitted shows that in a 2-in. screw machine drilling 3/4 x 5 1/4-in. holes in machinery steel at 6 1/2 in. per min., 3 to 5 pins were sheared per 300 holes, which was the production for 8 hours.

New Question for Manufacturers

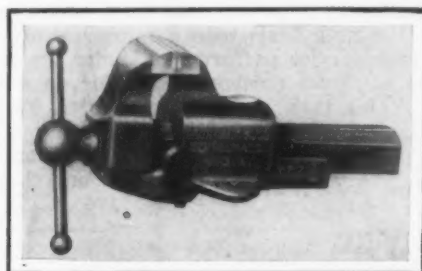
WASHINGTON, Dec. 6.—In addition to changes that are being made in the schedule in the census of manufactures for 1921, which have been previously pointed out, they contain one question prepared by the Secretary of Commerce that is taken to be significant. The question incorporated and to be answered by manufacturers is an inquiry as to the estimated percentage of

output compared with possible output "if you had had such demand as to require full running time."

In view of the expansion in the steel industry, especially in some departments such as plate capacity, the Government is trying to assist manufacturers in developing export markets so as to absorb the surplus output above domestic requirements. It is believed that the question incorporated at the direction of Mr. Hoover has a bearing on this subject.

New U-Beam Vise

The Athol Machine & Foundry Co., Athol, Mass., has placed on the market a U-beam vise of improved type, shown in the accompanying illustration. The material used in its manufacture and the workmanship



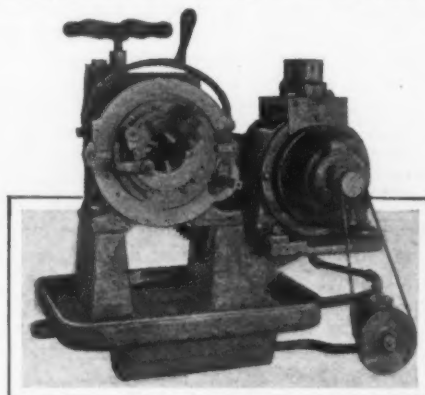
This Vise Is Bolted to the Top of the Bench

involved are the same as embodied in the company's machinists' vises, and it is said to be more rugged in construction than the oval slide type vise formerly made by the company.

The screw is of the buttress type, the nut of malleable iron, the jaws of tool steel, carefully checked and hardened. The beam, eye and ball are unfinished, but the surface of the vise otherwise is smooth and well finished. It is bolted to the top of the bench instead of the front, as is the oval slide type vise, thereby giving a better purchase. The improved type is made in four sizes, 2 1/2 in., 3 in., 3 1/2 in. and 4 in., weighing 13, 21, 30 and 37 lb., respectively. The jaws of the 2 1/2-in. vise open 3 1/2 in.; the 3 in., 4 1/2 in.; the 3 1/2 in., 5 1/2 in.; and the 4 in., 6 in. All parts are interchangeable.

Threading and Cutting Machine for Small Pipe

A motor-driven portable threading and cutting machine designed especially for rapid production of small pipe threads, either in the shop or on the job, has been



An Automatic Die Release Is Provided

placed on the market by the Curtis & Curtis Co., Bridgeport, Conn.

The machine is designated the No. 430 and is said to be entirely new in design. It is equipped with an automatic die release which opens the die when the thread is completed, while the machine is still running. An oiling system is provided and also an improved cut off and dies and cut off tools for the range of the machine. A commercial motor is used, adapted for any of the standard currents. The machine is self contained. Large range, light weight, simplicity of operation, and low price are features emphasized by the machines.

Investigation Favors American Valuation

National Association of Manufacturers Will, However, Ask Thorough Consideration of All Arguments—Modification May Be Agreed Upon

—BY L. W. MOFFETT—

WASHINGTON, Dec. 6.—Because of the wide diversity of views regarding the proposal to adopt the American valuation plan in connection with tariff making, much interest is manifested in the questionnaire sent out by the National Association of Manufacturers to its members in order to get their views on the subject. The referendum is being conducted at a time when this matter is occupying the minds of both the executive and legislative branches of the Government, as well as the business interests of the country.

As has been pointed out previously, it is unquestionably true that prominent men both in Administration circles and in Congress who originally were strongly in favor of the plan now entertain doubts as to its feasibility. Some who have modified their views claim that they have done so because of changed economic conditions during the past few months, particularly as they affect depreciation of foreign exchanges. It is their contention that, because of the further drop in these currencies, especially the German mark and the Austrian crown, resulting in low cost of production, when compared with American costs, an advantage exists, where raw materials are already on hand, that cannot be overcome by the adoption of the American valuation plan without at the same time setting up barriers against other foreign countries, including the allied nations.

It is recognized, however, that such a barrier is even increased under the present plan of basing customs duties on foreign valuations and that consequently the existing system does not meet the situation. Some sort of substitute is being considered but nothing satisfactory in this direction has yet been determined upon, although a number of suggestions have been made. Among the proposals is the granting of authority to the President to change duties by executive order as conditions of exchange require. The enormous propaganda, especially that conducted by importers and retailers, has without doubt had an important bearing in creating opposition to the American valuation plan.

At the same time, manufacturers' interests, including the iron and steel trade, are strongly in favor of the American valuation plan, and while realizing that it may have its disadvantages, it is maintained that it is a much more practical basis of assessing tariff duties than any other that has been suggested. The proposed Presidential power would be similar to the plan of issuing "orders in Council" along the system followed in Canada involving "variable" duties with a minimum fixed, below which drop in exchange is not recognized.

It is true also that there are members of Congress who still adhere to the American valuation plan, and some prominent members of the House Committee on Ways and Means have insisted that they will not accept any other principle of fixing duties, although they might consider revisions to the plan as it passed the House. While some Republican members of the Senate Committee on Finance also appear to be strongly in favor of the principle of the American valuation plan, it is apparent that they are ready to consider changes in the provision as passed by the House, as well as those prepared by the Finance Committee itself. Being a new subject, and having been brought up at a time of unprecedented world-wide economic conditions, there is confusion as to how the plan and the system of "variable" duties might work, and by reason of this it is hoped that considerable light will be thrown on the American valuation plan in the report by J. B. Reynolds, director of the American valuation investiga-

tion, which is to be submitted to the Secretary of the Treasury, and afterward laid before the Finance Committee.

The investigation, it is stated, has strengthened arguments in favor of the plan, and among other things has developed the fact that there are fewer "non-comparable" articles produced in this country than it was believed even by those supporting the plan. One of the chief arguments against it has been that it would not be possible to levy duties intelligently under the American valuation plan on many imports, because of the lack of similar articles in this country. It has been conceded, even by opponents of the plan, that on many products such as iron and steel, it would be a simple matter to apply the American valuation plan.

Other points are expected to be developed as a result of the referendum being conducted by the National Association of Manufacturers. The questionnaire sets forth arguments both for and against the plan. Those made in favor of the plan are as follows:

Arguments for Plan

American valuation means that ad valorem duties on imports will be imposed upon the American wholesale value in this country, instead of the foreign wholesale value of any country from which the goods may happen to be imported into this country. It has these distinct advantages:

1. It will prevent undervaluation for the reason that the value will be determined by the United States Government in this country, where we have jurisdiction to subpoena witnesses and to get at all the facts.

2. It will result in securing more revenue from low-priced countries, because the American value will be the same for any article, regardless of the country from which it is imported into the United States.

3. This plan will make it possible to treat all foreign countries alike by imposing the same duty upon the same article regardless of the country from which it comes, in accordance with our treaty obligations.

4. This plan will make it unnecessary for this Government to carry on foreign inquisition in an almost fruitless attempt to secure foreign values for the purpose of administering our tariff laws.

5. The American valuation plan meets the difficulties now confronting this country in imposing ad valorem duties, due to depreciation of foreign currency. Under the present law, the greater the depreciation the less the duty, so that those countries whose currency has depreciated to the greatest extent pay the smallest amount in duty.

6. The American valuation plan will be easier to administer within the intent and meaning of the law. Under this plan we have to have the wholesale value in one country only. Under the present law we have to attempt to be familiar with the wholesale values in more than 100 different countries from which articles may be imported into the United States.

7. The American valuation plan will make it possible to get an adequate protective tariff at this time against ruinous foreign competition, giving to the American workman an opportunity to earn a living.

It is of course easier to ascertain the American wholesale value of any commodity than it is to secure the wholesale value in the various foreign countries as required under existing law. Unless the American valuation plan be adopted the present chaotic condition will continue indefinitely.

Arguments Against Plan

Arguments in opposition to the plan are as follows:

The American valuation schedule is impractical of operation, for the reason that it is impossible to state what is an American value. This must therefore be left to the judgment of a board of appraisers, and human judgment is always fallible.

An example of determining value, with which every one is

familiar, is automobile tires. What is their value? There are many makes—all claiming to be first-class, and with great variation in prices.

To determine the uniform value for products would be equivalent to fixing prices by a Government board, which is a condition that is not to be desired and, further, would be a basis of making uniform prices throughout the market in contravention of the Sherman anti-trust law. Though the present method of determining values has difficulties, these are all recognized, and methods of meeting them have been worked out, and are due largely to dishonest people presenting false documents and facts, and the percentage of these is small in comparison with the total amount of business.

With the increased efficiency of our consular service, due to placing this under the civil service rules, these difficulties are rapidly disappearing.

The demand for the American valuation schedule has arisen largely from the disturbance in the normal rates of foreign exchange, and this condition is taking care of itself.

The American valuation schedule would pledge the country to the protective tariff policy and ad valorem duties, which would immediately place it in the category of a political issue and subject it to possible change with every change of administration, which would add one more variable factor for the disturbance and upset of business in the United States.

ACTIVE PIPE DEMAND

Large Tonnage Awarded Steel & Tube Co. of America—Fair Sheet Business at Youngstown

YOUNGSTOWN, Dec. 6.—In most active demand are line pipe, storage tanks for oil and tin plate. The Youngstown Sheet & Tube Co. is now working off the order, divided with the Steel & Tube Co. of America, involving about 17,000 tons of 8-in. line pipe, placed by the Pure Oil Co. The Steel & Tube company also took the Sinclair Oil Co. business, involving about 13,000 tons of line pipe, including 90 miles of 10-in., 60 miles of 8-in. and the rest divided equally between 2-in., 3-in. and 4-in. casing. There was keen competition among makers for both of these orders, and the fact that Western makers received the lion's share of the business indicates their location advantage, as compared with producers in the Pittsburgh or Youngstown district, for Western and Southwestern tonnage.

Volume of business of the Electric Alloy Steel Co. has been steadily increasing since the middle of the year. The company received 63 orders in July, 74 in August, 83 in September, 104 in October and 145 in November.

Sheet Prices Firm

Scattered sheet tonnage is keeping district capacity engaged at about 50 per cent, considerable output going to the automobile industry. Prices for the present at least are firm at 2.25c. for blue annealed, 3c. for black and 4c. for galvanized, though there are hints that weakness may develop in the latter two grades. Car roofing interests continue to take sizable tonnages, while small quantities are going to makers of mesh for road building. The metal furniture industry is a steady consumer, in limited tonnages. Auto body manufacturers are inquiring for 1922 tonnage and their requirements represent a considerable aggregate.

One district interest recently worked off an order for 600 tons of No. 30½ gage black sheets. Sheets material produced in this district has been consigned recently to the fabricating plant in Japan maintained by an important district interest. Several 300-ton orders of mixed grades and gages were received last week by Valley interests. Stamping and pressed steel concerns are taking regular quotas of sheets, strip steel and light plates.

Orders for Tanks

A tank builder in this territory has booked two 55,000-bbl. oil storage tanks and inquiries for 20 additional tanks of the same capacity are being figured. Some of this business, it is confidently expected, will come into the Valley. Reports received by pipe makers and tank interests generally from their Southwestern representatives indicate that considerable business is developing in the South, largely from oil groups.

Tin plate tonnage for first and second quarter delivery in 1922 is coming through in good volume and is holding operations of both independents and the Steel Corporation subsidiary in this territory at 80 per cent in this division. Recent tin plate orders included a number from canneries along the Pacific Coast, packing salmon. The Standard Oil Co. has likewise been taking tin plate for conversion into containers. Tobacco manufacturers have been among recent buyers. Reports of price weakness have so far not been reflected in this territory, though independents have re-

peatedly cut under the Steel Corporation this year in order to get business.

It is evident that prices of wire and wire products have slipped a peg and that makers are accepting tonnage at the level which prevailed prior to Sept. 12 last, of \$2.50 per 100-lb. plain wire and \$2.75 per base keg of nails. With some independents it is doubtful whether the higher prices of \$2.60 and \$2.90 respectively ever found much basis in transactions. The principal producer of wire products in this territory, for instance, lagged behind other makers in the last price advance. Indications are that tonnage is being accepted at the lower levels under blanket contract arrangement.

Inquiries for Sheet Bars

In semi-finished material, chief interest is in the inquiries which are being put forth by a number of non-integrated sheet makers to cover their first half 1922 requirements. Business of this nature is now being closed and additional contracts will be signed before the end of the year, or current contracts extended. Only unattractive open-hearth sheet bar tonnage elicits a quotation of \$32, the ruling figure being \$30. Makers report little slab or billet tonnage before the trade.

Strip business is moderate and promises further recessions before the year ends. Effort to move up quotations \$5 per ton has met with little success. Quotations therefore continue at 2c. for hot-rolled and 3.75c. for cold-rolled. Automobile makers continue to take the largest tonnages.

In the pig iron market, chief interest centers about the inquiry of the Trumbull Steel Co., which has been in the market for several thousand tons. Carload lots of iron are sold occasionally, especially to foundries. It depends altogether on how anxious makers are to sell, whether the price goes below \$19.

Plates are quotable in the Valley at 1.50c. to 1.65c., with demand very spotty.

Foundrymen's Convention and Exhibition in 1922

Following the announcement that the next convention and exhibit of the American Foundrymen's Association will be held in Cleveland the week of April 24, 1922, many letters have been received by the association, asking when floor plans and application blanks will be ready.

C. E. Hoyt, secretary of the association, states that "floor plans showing the layout of exhibit space in the arena and exhibition hall, together with application blanks and general information, will be mailed to all former exhibitors, following the meeting of the convention and exhibits committee, held in Cleveland, Tuesday, Dec. 6. A number have already advised that they are planning to show something entirely new at this exhibition and, while we will not have space for as large a show as in 1919 and 1920, we hope to take care of all our old exhibitors and present to the men of the foundry industry the most interesting exhibition of equipment ever shown."

A banquet will be held Dec. 12 at the Nelson Hotel, Rockford, Ill., on the occasion of the first regular meeting of the newly organized local chapter of the American Society for Steel Treating. Among the addresses will be one by W. H. Eisenmann, national secretary of the organization.

Blast Furnace Building in China

G. Gordon Green Tells of Progress in Erecting the Stack in a Suburb of Peking and Gives Interesting Description of Business and General Conditions

IN a recent letter to W. W. Hearne, Matthew Addy & Co., Philadelphia, G. Gordon Green gives an interesting account of conditions in China. Mr. Green is a brother of James A. Green, president of the Matthew Addy Co., Cincinnati. He was born in Cincinnati and educated at the Columbia School of Mines, New York. A number of years ago he was employed by Charles C. Perin to tear down the Battelle furnace at Battelle, Ala., and move it to India, erecting it in that country for the Tata Iron & Steel Co., and afterward he erected two other furnaces in India for Perin & Marshall. He is now erecting a blast furnace under their direction for the Lungyen Mining Administration in a suburb of Peking. He writes from Shiechinshan Iron and Steel Works, Shiechinshan, West Peking.

"Our furnace work is getting on nicely," says Mr. Green, "and we expect to finish May 1. It is the brickwork that will hold us up to that date, since most of the plant will be ready in March. Our plant is one of the sights of Peking and visitors come here every day or two, Chinese, Japanese and foreigners. The stoves are finished and are being bricked now. The furnace is rising above the charging platform. The 180-ft. stove chimney is finished and the boilers and stack and powerhouse are all taking permanent form. We have done all this in 90 days and I am proud of the record. If we can light the fires on June 1, 1922, it will mean that we have built an entire plant in one year, exclusive of excavation, which was not pushed. But we put in our first concrete May 25 this year. I see THE IRON AGE of Sept. 15 says that the new Trumbull furnace in Ohio was built complete in ten months and claimed that as a record. If we do it in 12, I will certainly claim that as a record. In India they cannot do it in that time, nor in twice that time, and the last furnace built in China took seven years and is not in blast yet. The old Battelle furnace in 1903-1904 took 18 months to build and that plant was not as large as this one."

Imports Manganese Ore

As to manganese ore, Mr. Green says:

"China imports a small quantity of manganese ore, probably for use in open hearths at Hankow—the Han-yang Iron Works—but I cannot find where China exports any manganese ore at all. In the commercial statistics, China is said to export about 45,000 tons of miscellaneous ores valued at about \$90,000. As this is other than iron ore—of which China exports to Japan about 300,000 tons yearly—and the value runs about \$2 Mexican money a ton, it is quite possible that some of it may be manganese, but it is not specified."

Great Possibilities of China

As to business and general conditions, Mr. Green says:

"We should get over our idea that China is so different from the rest of the world. They surely have a most curious mixture of conditions, varying from those of medieval Europe to ultra modern. Practically they have no government at all. Most of the departments of the government are business institutions pure and simple, the heads of which have managed, in ways known only to themselves, to achieve the power of their positions.

"Notwithstanding that government as we know it does not exist in China, and there is no national unity, the Chinese often exhibit traits that indicate that if a great leader, strong and able, were to weld China, or even half of it, into one working unit, the possibilities would be tremendous. The basic material is here, but the leaders are lacking. But in business the Chinese are very like all the rest of us. And like all the rest of us, there are very good men and very bad men and

everything in between; and the proportion of good men in China would not suffer by comparison with any other nation—least of all by comparison with ourselves. Within the last few years there have been many wild-cat schemes launched in China by Americans that never had any merit or even purpose other than pure theft, and it has not done the nation any good. However, there are many old companies and some new ones that are perfectly honest, and this the Chinese know. It is these concerns that uphold our good name in China.

Chinese Are Like Americans

"The Chinese are more like us than any other Orientals I have ever met. They think about as we do and the workmen do their work in much the same way as do our workmen. Most any of my men, in any line of work, would fit in with any of our home organizations and with little training would very quickly be so like our own men that you would not notice the difference.

"There is a vast amount of talk just now about our future in China. We haven't made a start on it yet. It is going to take many years of slow plodding work to get acquainted with these people, and one of the first things we must do—the hardest thing we will have to do—is to learn that we must do business with the Chinese in the Chinese way and not in our way. We stand small chance of making the Chinese do our way.

"They are millions to one and they are deep-rooted in the belief of their way of doing things. Had we a thousand concerns in China where we now have one, it would not make a dent in the manner of doing business with the Chinese. It must be done slowly, with smiles and tea and in mixing with them socially to a large extent and particularly in studying their personal and individual makeup and in dealing with them man to man. The impersonal relationships fostered by our big business is entirely unknown here. Furthermore, the Chinese is a very efficient trader, and where graft does not enter, price and quality are essential. The Chinese detest England, but have faith in English business. Japan has many friends and many enemies, but in business—usually the smaller businesses—she has a tremendous footing in China. France and Belgium also have business connections here out of all proportion to their size. But the Chinese do not fear us and do not hate us. They hope to benefit by our friendship. In certain lines they recognize our superiority, but there is always a lurking suspicion that quality is not our strong point. We are too fast, therefore we cannot be as good as the slower ones. This does not apply to railways or blast furnaces or machinery, but does apply to lesser things.

Chinese Business World

"Political upheavals do not mean upsets in business, but apparently are things entirely outside the Chinese business world. They do not affect the coinage values, since these are only and always the actual silver values. The Chinese government issues nothing but coin—no paper—except shimplasters for very small values. But all the paper money of a value of a dollar and more are issued by private banks, both Chinese and foreign, and some of the Chinese banks are of a semi-official character, but the money bears the promise of the bank, not of the government. This money circulates at par and sometimes when a bank fails—as did recently the French bank—the other bankers themselves arrange to redeem the outstanding paper and collect from the defunct bank if they can—which they did in this case. There was but a few days when the value of these notes fluctuated, quickly coming back to par at the time of redemption. Political upheavals sometimes are the

means of destroying property, but the risk of this is very small indeed.

Future American Relations

"As to the future of America in China, we must secure from China certain rights privately protecting American property in China and then by uniting with Chinese capital, and dividing directorates and management, develop China industrially, gradually raising wages to such a point that the Chinese workmen can improve their living conditions and have a surplus to spend—to put money in the hands of these millions of people and to cultivate in them a desire for the better things of life, a willingness to work for it. That desire already exists. If these men had a chance to improve their conditions in life they would work as no other people ever worked. It would automatically create a demand for the things that industrial China would produce. But we cannot do this with wholly American capital and wholly American management. To win and hold their good will, and to bring the efficiency of industrial works up to the highest attainable, it is necessary for us to divide capital, management and responsibility with them. Unlike any other Oriental people, except only the Japanese, they have the country, the climate and the individual capacity to rise to such an opportunity and to make the most of it. This would make for the most rapid education of both the Chinese and of ourselves, for we have quite as much to learn about it as they have. Furthermore, the English and the French are totally unsuited temperamentally to become successful copartners with the Chinese in the development of their country. They can never mix with them as we easily do and besides they have had no training in building up a country, a training such as we have been getting for the last hundred years."

Proposal to Abolish Private Manufacture of War Materials

A proposal for the abolition of private manufacture of war material has been made to the Committee on Land Armament at Washington by Edgar Park, organizer and first president Marlin-Rockwell Corporation. His suggestion is made on the premise that "the people of every nation are convinced that the private development and manufacture of munitions of war is extravagant, inefficient and improper; that it acts as an incentive to war and constitutes a perpetual pre-war influence."

Anticipating the argument against his proposal to the effect that it would throw workmen out of employment, he states that such procedure would be similar to the throwing of bartenders out of work because of prohibition, and would be justified. Workmen could find better jobs in peace time pursuits.

Mr. Park organized the Marlin-Rockwell Corporation in 1915 and first manufactured 18,000 machine guns for Russia. After the United States entered the war his company made machine guns for the American training camps and devised a new type of machine gun for shooting between aeroplane propeller blades. The company owned three factories in New Haven, Conn.; three in Philadelphia and one each in Boston, Pittsburgh, New York, Norwich, Conn., and Southern Delaware. The company has converted its plants for the manufacture of automobile accessories.

Mr. Park would substitute a system of manufacture, allotment and use of war materials under international control.

An increase of 4.4 per cent in the number of persons employed in the large manufacturing establishments of Rhode Island during November is indicated in records supplied by George H. Webb, commissioner of labor, Rhode Island. The largest gain is shown in the metal trades. During October employment increased 6.3 per cent.

The Brier Hill Steel Co., Youngstown, Ohio, has suspended its Western Reserve works at Warren, consisting of eight sheet mills.

Weatherproofing New Hudson River Bridge

That an annual saving in upkeep of \$400,000 in the proposed Hudson River bridge will be effected by means of a new feature of bridge construction, is stated in a bulletin of the Copper & Brass Research Association, 25 Broadway, New York. The plan, in brief, is to weatherproof the bridge with bronze.

The steel work will be so completely inclosed with rain-and-moisture-excluding bronze that the annual cost of repainting—a serious item in the upkeep of a big bridge—will be reduced to a minimum. That this matter of protection figures in maintenance economy, and is indeed vital, is realized when it is understood that it is expected to reduce the cost of painting from \$500,000 annually to about 15 per cent of that figure.

In the bridge are to be a pair of suspension trusses or inverted arches spaced 160 ft. apart, center to center, each truss consisting of two cables from 60 to 80 ft. apart vertically, with vertical panels and diagonal bracing between to supply the stiffening under passing loads. From the two suspension trusses, vertical eyebars chains carry the double-deck floorway.

On the proper strength, functioning, and permanence of the chains depends the integrity of the bridge. Each eyebar is separated several inches from the adjacent bar, so that it can be inspected at any and all times. Each cable is inclosed in a covering or gallery of bronze for protection and to permit of inspection, so that, once the eyebars are painted they will be well protected from the elements.

Prices of Refractories Still Shaded

PITTSBURGH, Dec. 5.—Prices of refractories still are soft and there are so many instances of shading of what are regarded as the regular market quotations on fire clay and silica brick that an early revision downward of these quotations is likely. Sales of high duty Pennsylvania fire clay brick have been done fairly frequently of late at \$32 as against the quotation of \$34, and the latter price no longer means much. Similarly the product of other districts is being priced so that business may be secured. The recent reduction in silica brick has failed to stabilize the market, as less than \$28 recently has been accepted by some Pennsylvania makers. Chrome and magnesite brick remain weak.

Business again is dwindling after having been on a rising scale since about the middle of the summer. That point brought a turn in the iron and steel industry and was followed by the releasing of shipments on old orders for brick and some new business. The refractories industry got down to as low as 15 per cent of capacity operation during the extreme low point of iron and steel production last July, but from that it went back to about 30 to 35 per cent operations. The indications are that this month will bring some reaction from this rate, for outside of the Steel Corporation subsidiaries, the trend of steel plant activities is down. The falling away may not be relatively as great as that in the steel industry, however, because the glass manufacturers and some other brick consuming industries are doing better now than before in some time. Real activity in refractories, though, depends for the most part on how well the iron and steel industry is doing.

We quote per 1000 f.o.b. works:

Fire Clay	High Duty	Moderate Duty
Pennsylvania	\$32.00 to \$35.00	\$28.00 to \$32.00
Ohio	32.00 to 35.00	28.00 to 32.00
Kentucky	32.00 to 35.00	30.00 to 32.00
Illinois	35.00 to 38.00	30.00 to 35.00
Missouri	37.00 to 40.00	28.00 to 33.00
Silica Brick:		
Pennsylvania		28.00
Chicago		35.00 to 38.00
Birmingham		40.00
Magnesite Brick:		
Standard size, per net ton.....		52.00
Chrome Brick:		
Standard size, per net ton.....		46.00

The Noiseless Typewriter Co., Middletown, Conn., has increased its working hours from 32 to 48 hours per week, but has reduced its working forces approximately one-third, and has made a wage reduction of 10 per cent.

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The Trade Commission's Charges

Statements made by the Federal Trade Commission in the case pending in the Supreme Court of the District of Columbia to compel certain manufacturers to submit advance sheets in the cost reporting case show surprising ignorance of steel trade conditions by a body which should be well informed as to all the industries of the country. This is the most charitable statement that can be made in regard to allegations set forth in the document filed with the court a few days ago. The commission charges that the prices of steel products have declined from the war prices much less than those of many other commodities, and that, as a result of the general feeling that price readjustments in the steel and iron industry are out of line, people generally have stopped buying or are buying only as little as possible; that this has an effect upon the whole industrial and trade structure.

The facts have been published repeatedly in THE IRON AGE and elsewhere, showing that prices of iron and steel products are now only 26 per cent above those of 1913 and are, in fact, relatively lower than those of 1913 when it is considered that the costs of transportation, labor and fuel are much higher than they were before the war.

Only recently it has been shown that the liquidation in prices of steel has proceeded to a much greater extent than that for furniture and house furnishings, building materials, cloths and clothing, fuel and lighting, chemicals and drugs. In some of the leading finished material products, such as bars, plates and beams, prices have fully returned to figures that were common in pre-war times or have gone even lower.

If any people are not buying things they need because they think that iron and steel prices are too high, it is because they are deceived by such statements as those issued by the commission. During a bitterly contested campaign, such allegations might be made by demagogues and irresponsible newspapers, but it is not to be expected that what ought to be a dignified and judicial body, a branch of the Government entrusted with highly important duties relating to the business of the country, would be so woefully lacking in information or so reckless in misrepresentation. While

ostensibly seeking information by prying into the affairs of many companies, the commission is refusing to avail itself of facts that are at hand. The question before the court, which the members of the commission apparently seek to evade by stirring up the public mind, is whether the commission has the right to require the steel companies to expose their costs and to go to many thousands of dollars annual expense per company in filling out forms entirely different from anything they have ever kept in their own business.

Unfortunately, it is true that prices of farm products have declined to such an extent that the financial condition of many farmers is approaching bankruptcy. The reports indicate that corn is being burned in some Western States because it does not pay to send it to market. Is it the Federal Trade Commission's desire to bring the iron and steel industry, already showing losses on every month's business, to the distressing condition of the farmers?

Revising War-Time Shop Rules

The revision of working rules of railroad shop crafts by the United States Railroad Labor Board, as announced last week, marks a distinct advance in restoring common sense to the operation of the railroads. In war times, even after the signing of the armistice, the domination of the railroad unions was so complete that all kinds of unreasonable regulations were forced upon the railroads. There were often ridiculous restrictions on the kind of work different workmen might do, and they increased the cost of operation to an amazing extent.

Careful study of the recent decision and a comparison with the old rules, as made in the letter of the Chicago representative of THE IRON AGE printed elsewhere, indicate that the open shop has not been recognized to the extent indicated by newspaper reports. It is true that the new regulations authorize non-affiliated employees to present their grievances to the railroad management, but throughout the rules reference is made to local committees which, in all probability, will be made up of representatives of the majority who are unionized. For this reason the unions will continue to dominate to a large extent, but some chance

is afforded the non-union man to assert his rights, and carriers that have agreed with their employees upon any rules may continue that arrangement.

Many of the narrow restrictions of the old rules are wiped out. Hereafter, for example, when a boilermaker is sent out on the road to do repair work, he is to be accompanied by a helper only when such a helper is necessary. The mere fact that the making of this rule is required shows the extent to which nonsensical regulation had advanced. The old plan was to increase expenses by hiring helpers at high costs whether they were needed or not. Even in the case of wrecks, unreasonable exactions were insisted upon and are now made impossible.

One of the most interesting features is that which provides for a new type of apprentice—a man, who, having obtained a technical school education, can now become a journeyman after only three years of apprenticeship. Certainly a student of such education should have an opportunity to use that education, and the new rule gives it to him.

The estimate that the railroads will save \$50,000,000 under the new regulations may not prove correct, but whether that figure be close to the fact or not, the country is to be congratulated upon obtaining a considerable degree of freedom from the unreasonable and wasteful war-time exactions of the railroad unions.

The Call for Lower Freight Rates

On all hands there is criticism of the present railroad freight rates and a clamor that the rates be reduced. But the attitudes of the various critics show differences in the reasons given for the reductions and in the things held responsible for the high rates. Some of the arguments used are unsound and naturally irritate railroad officials. But it is unfortunate, and at the same time unfair to many sensible men who are by no means unfriendly to the railroads, that the roads should so generally assume the defensive on proposals for rate reductions.

Some newspapers have told their readers that salaries for railroad management are altogether too high, that the Interstate Commerce Commission's valuation of the railroads, against which the 6 per cent objective in earnings was computed, is \$5,000,000,000 to \$7,000,000,000 too high, and that the railroads are wasting money in various ways. A great many charges are made that are absolutely false, and they are made in connection with an argument that freight rates should be reduced. Then there are those who contend—and a strong case has been made for the contention—that railroad wages are too high and that a great deal of money is being wasted on account of the working conditions prescribed by the National Agreement. These men also urge that freight rates should come down.

The comparisons commonly made as to freight rates are between rates in 1913 or 1914 and rates at present. It will be recalled that for several years

before the war railroads had advanced rate cases before the Interstate Commerce Commission almost constantly, and one of their arguments was the great decline that had occurred in rates. The comparisons now being made, therefore, are not necessarily entirely fair. The *Railway Age* has done a service to intelligent men, who wish to consider this subject from the broadest viewpoint, by giving a presentation, in its issue of Dec. 3, of average rates per ton mile from 1890 to date, with concurrent prices of groups of commodities according to the Bureau of Labor's index numbers. The basis, 100, is the average for 1890 to 1899, inclusive. Rates were in a trough in 1913, 1914, and 1915, standing at 87 for each year, while in July of this year they were at 149. In 1913, 1914 and 1915 commodities, instead of being in a trough, stood at 135, while in July, 1921, they were at 200.

Accordingly it makes a wide difference whether in comparing freight rates and commodity prices one uses 1913 to 1915 as a basis or makes 1890 to 1899 the basis, because in 1913-15 freight rates had gone down 13 per cent from the 1890-99 average, while commodity prices had gone up 35 per cent. Using 1913-15 as a basis, freight rates last July were up 71 per cent and commodities were up only 48 per cent, but using 1890-9 as a basis, freight rates are up only 49 per cent, while commodities are up 100 per cent.

The argument for a reduction in iron and steel freight rates has come from an industry whose fortunes have been closely linked up with those of the traffic lines traversing the most thickly populated sections of the country. In 1896-7 the railroads in this territory found that a chief contribution to their prosperity was made by their own unparalleled orders for equipment, seeing that every ton of steel thus utilized represented the hauling of six tons of freight. Moreover, it was realized and admitted by railroad officials, when the 40 per cent advance was made last year, that it bore heavily, too heavily, against coal, coke and ore, the raw materials of iron and steel manufacture.

In the case of the Lake Superior ore rate, which is under consideration at Chicago this week, last year's advance on the Mesaba range from 63½ cents per ton to \$1 per ton (with corresponding advances on other ranges) represents an addition of nearly 57.5 per cent—a burden against which the mining companies unitedly protest. The facts concerning that increase in the cost of iron and steel making should have fair and full consideration in just the way in which the facts about the relation of present freight rates to those of other periods should be considered. That seems to be a case in which the railroads would do themselves credit by uniting with the petitioning mining companies and asking the Interstate Commerce Commission that a reduction be made.

There are signs that in some respects readjustment in Continental Europe, outside of Russia, has proceeded farther than is generally believed. Agriculture there is in better condition than in seven or eight years. Socially Europe is more

stable than any time since the armistice and more stable even politically; but the outstanding fact that obscures all else is that Europe has been degenerating in its handling of government finance. To put an end to currency inflation there is so fundamental that for American business and finance to emphasize the money cost of maintaining land fighting machines is entirely in order. What is particularly interesting in this connection is that the deficiencies in the budgets of European countries are almost exactly the costs of land armaments. Thus a discussion of the limitation of land armaments is regarded as vitally important if this country is to develop the confidence in Europe that is essential if financial aid is to be extended by the United States.

Price Relations

A point in the general liquidation of iron and steel prices should not be overlooked, that there has been an almost complete return to the relations between pig iron, billets and finished products, respectively, that obtained before the war. Under the war-time control billets were placed enough above pig iron to insure a profit to the steel maker who bought his pig iron, and finished steel products were placed enough above semi-finished steel to give a small margin to the finishing mill buying its steel. That was an unusual alignment. The arrangement was adopted in order to stimulate production and enable all plants to run.

It may be asked how non-integrated plants were able to operate when there was no war. There were various opportunities. As markets rose and fell there was a chance to cover raw materials ahead in an advancing market. Long-time contracts were sometimes made at special prices. The finishing mill frequently obtained a premium for quick delivery of its product, and many specialties were made, commanding prices above the base rates. Practically all these items were non-existent at the time of the war control, chiefly because the control prices represented large reductions from the previously existing market.

Taking billets as a balancing or intermediate material, they have been quoted lately at \$29, and that is precisely the price to which billets rose in the 1912-13 advance. Basic pig iron reached its top back there at \$16.50, valley, or somewhat below the present market, while merchant bars got up to 1.40 cents and shapes and plates to 1.50 cents, or \$28 and \$30, respectively, per net ton. They average a trifle higher now.

At the low point at the end of 1914 open market prices were \$12.50 for pig iron, \$19 for billets and 1.05 cents for bars, shapes and plates. The spreads were of course smaller in dollars, while on the percentage basis a difference was that billets were relatively lower. The percentage of bars, shapes and plates above pig iron was almost the same at the low point as at the high point. One may take it that the high market all around affected billets somewhat more than either pig iron or finished products, or that when all prices were low billets suffered the most.

If a student of statistics, absolutely ignorant in

iron and steel, were given a chart of pig iron, billet and finished steel price fluctuations for a number of years before the war and a schedule of prices now existing, his judgment would be that pig iron is now a trifle too high, but that billets and finished steel products stand in natural relation. A full knowledge of the subject would furnish the explanation. Practically all items of cost are much higher now than before the war. In one way or another the higher wage rates, higher taxes and higher priced materials generally affect all branches of the iron and steel industry in much the same way; but there is one notable exception. The higher freight rates fall much more heavily in percentage of the value of the product made, upon pig iron than upon semi-finished steel or finished rolled products. The matter of freight rates really explains somewhat more than the divergence that is found. In other words, pig iron is now a trifle low by comparison with billets and finished products, when allowance is made for the factor of freight costs.

New Etching Mediums for Steel

The possibilities of etching mediums for steel examination were emphasized by an article in THE IRON AGE of Dec. 1 which gave the results of a new German etching solution. Hitherto it has been the aim, in using etching compounds, to bring out details of microscopic or macroscopic structure. The new medium, perfected by Germans, reveals in detail the strain lines in a low carbon steel as distinct from the actual crystalline, pearlitic or other structure. In other words, so far as the new solution has been tested, it is possible to locate alterations in the body of the steel caused by stress. No other method of etching has accomplished such results. While the new solution has been found available thus far for mild steel only, it will be of great value in future investigations, if made capable of general use. It is known that many steel failures, of rails in particular, are due to over-stressed metal and that fatigue failures are due largely to the same cause.

An experiment recently conducted by a large Eastern railroad presents a striking analogy to the German results. Thin strips of highly polished low carbon steel were laid on the surface of a rail over which a locomotive wheel was allowed to press gently. It was found that there resulted in the strips a distinct set of lines, entirely different from anything encountered previously. These lines bear a singular resemblance to the strain lines brought out in one of the pieces of German steel. In other words, it seems probable that similar lines of stress were developed in the two pieces of steel, the one brought out by unusual conditions, the other by the new etching process.

Developments in this field of research are increasingly rapidly. The Bureau of Standards has been conducting some important work on new ways of etching nickel steel and some striking results have been reached by the use of hydrogen sulphide on certain non-ferrous alloys in a method of "contrast etching." The discovery of the new German medium is prophetic of new and

delicate combinations of chemicals which may gradually revolutionize our knowledge of steel and of other metals and alloys.

An interesting analysis of pre-war and current exports of iron and steel by Great Britain to its own dominions has been made by the *London Iron and Coal Trades Review*. The results are rather unexpected in view of conditions in the British industry this year. In 1913 the total steel exports to countries within the empire represented 46 per cent of the total. In 1920 there was a decline to 30 per cent; but for the nine months ended with September, this year, the percentage has risen again to 43 per cent, or only a little less than in 1913. While the actual tonnage this year is small in comparison with 1913 or even 1920, the percentage showing reveals the intimate connection existing between the mother country and its dominions. It is also a factor which must be reckoned with in all estimates of future export trade in steel. There is also, however, to be taken into account the new steel capacity in India and Canada. Further additions are under way in India, and new plants in Canada for making steel plates and tin plate have been a factor in reducing imports from Great Britain. In general, the rapid recovery of the British steel export trade in the last three months is a fact not to be overlooked.

CORRESPONDENCE

Demand for Railroad Readjustments

To the Editor: There seems to be no question that the present transportation costs on steel products, and particularly fabricated structural steel for bridges and buildings, are so far in excess of an equitable proportion that in order to bring about a return to normal conditions in the building industry there must be a considerable reduction in freight rates on all iron and steel and on materials entering into their production.

The Bridge Builders and Structural Society, after a careful investigation of the subject, has found that at the present selling price of fabricated structural steel, the item of freight amounts to about 40 per cent. Fabricated steel to-day is selling at not more than 50 per cent over the average prices of 1914, while the item of freight alone is more than 100 per cent over the 1914 cost. The fabricator has reduced his labor and other items of cost in every way possible and is now sacrificing a part of his overhead charges in his efforts to meet the demands for lower prices. The item of freight alone is unchanged.

Recognizing the need for readjustment of freight costs, the Bridge Builders and Structural Society recently prepared and adopted a resolution (copy inclosed) and has sent it to various railroad associations and to officers of the Government having to do with railroad and labor matters, with the hope of shortly bringing about an improvement in the relationship between freight and other cost items.

GEORGE E. GIFFORD,
Secretary Bridge Builders and Structural Society.
New York, Nov. 30.

The resolution set forth that "it is the sense of this society that business revival on a stable basis and common justice to the wage earners in our industry demand a prompt readjustment of freight rates and railroad wages in such a manner as to bring about a proper and equitable relationship between these elements and commodity prices and wages in our industry; and further, that it is the sense of this society that Government

interference with railroad management should be so far eliminated that the railroads may be operated with sufficient freedom to meet promptly changing economic conditions."

Complaint in Pittsburgh-Plus Case is Amended

WASHINGTON, Dec. 6.—Assigning as its reason the simplification and expediting of the hearings, the Federal Trade Commission has amended its complaint against the United States Steel Corporation and its subsidiaries in the so-called Pittsburgh-plus case so as to make the charges refer to each particular rolled product as distinguished from "discriminating in price between the purchasers of all of its rolled steel products" as alleged in the original complaint. The issue in the amended complaint is the same as that contained in the original complaint. The amended complaint makes precisely the same charges with respect to each particular rolled product and charges, as did the original complaint, that such alleged discriminations are in violation of the Clayton and Federal Trade acts for the reason that they are not made because of any difference in the grade, quality or quantity of the product sold, nor because of different costs of selling or transportation, nor because the different prices were made in good faith to meet competition.

The commission considers that by taking up each product separately it establishes a more specific case and it will shorten proceedings by making it unnecessary to gather a greater amount of evidence. It specifies the particular products sold on the f.o.b. Pittsburgh basis and those not so sold, such as rails.

The Steel Corporation has 30 days from yesterday, when it was served with the complaint, to make reply, in consequence of which hearings cannot begin before the expiration of that period.

Broadening Use of A. S. M. E. Boiler Code

The annual report of Charles E. Gorton, chairman of the administrative council of the American Uniform Boiler Law Society, 253 Broadway, New York, shows continued progress in the legal adoption and use in various states and cities of the steam boiler code drawn up under the auspices of the American Society of Mechanical Engineers. Mr. Gorton's activities in the last year have been directed in a large part to cities and States of the western part of the country. The Industrial Accident Commission, California, has approved the adoption of the code. Tulsa, Okla., voted to make it effective on Jan. 1, 1922. The Industrial Accident Commission of Oregon put the part of the code relating to new installations in effect on July 1, 1921, and the part relating to existing installations effective Jan. 1, 1922. Early announcement of the date of application of the code for Delaware is expected and rules were formulated for the operation of the code in Maryland. Development in details respecting the use of the code in Oregon, Michigan, Illinois, Massachusetts and possibly Hawaii were given extended attention in the report.

Circular of the Bureau of Standards, No. 113, entitled, "The Structure and Related Properties of Metals," which replaces one of earlier date (No. 42, Metallographic Testing), is a comprehensive discussion of that phase of metallography indicated by the title. The numerous examples which have been used throughout the test have been taken from the results of metallographic examination made by the Bureau, of specimens submitted for examination as well as those for research. The various methods for revealing the microstructure as well as the meaning of the features revealed are discussed, and a list of reagents for revealing the microstructure included. By means of numerous "live" examples the conditions which affect the structure of metals are discussed, also the effect of structural features upon mechanical and chemical properties of metals. A rather comprehensive discussion of the applications of the microscopy of metals has been given.

IRON OUTPUT UP AGAIN

November Production 6968 Tons Per Day Larger Than That of October

Twenty-four Furnaces Blown In, None Shut Down

The upward swing in the pig iron output of blast furnaces, which started in August after the low point of the year in July, continued in November the momentum gained in October. The gain per day last month was nearly 7000 tons as contrasted with 7465 tons per day in October over September. Gains in August and September over the previous months were 2070 tons and 2891 tons per day, respectively. The November total is close to the February production of 1,595,522 tons.

The production of coke and anthracite furnaces for the 30 days in November amounted to 1,415,481 gross tons or 47,183 tons per day as compared with 1,246,676 tons or 40,215 tons per day for the 31 days in October, according to data revised since the original returns by telegraph were published in THE IRON AGE, Nov. 3. The increase in November over October was 168,805 tons or 6968 tons per day.

The total number of furnaces in blast on Dec. 1 was 120 as compared with 96 on Nov. 1, with 82 on Oct. 1, with 70 on Sept. 1 and 69 on Aug. 1, the low point in the recent decline. In November, 24 furnaces were blown in and none blown out. This is the first month in the year in which no furnaces have been blown out or banked. The capacity of the 120 furnaces active Dec. 1 is estimated at 51,665 tons per day as compared with 40,850 tons per day for the 96 furnaces active on Nov. 1.

The November output of manganese-iron alloys was only 3525 tons, all ferromanganese, no spiegeleisen having been made for several months.

Daily Rate of Production

The daily rate of production of coke and anthracite pig iron by months, from November, 1920, is as follows:

Daily Rate of Pig Iron Production by Months—Gross Tons			
1920	Steel Works	Merchant	Total
November	71,669	26,161	97,830
December	66,037	20,185	87,222
January, 1921	62,327	15,618	77,945
February	58,060	11,127	69,187
March	42,691	8,777	51,468
April	33,854	5,914	39,768
May	33,054	6,340	39,394
June	29,444	6,050	35,494
July	23,086	4,803	27,889
August	26,037	4,743	30,780
September	27,189	5,661	32,850
October	33,365	6,850	40,215
November	37,960	9,223	47,183

The figures for daily average production, beginning with January, 1915, are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1915—Gross Tons									
	1915	1916	1917	1918	1919	1920	1921		
Jan.	51,659	102,746	101,643	77,799	106,525	97,264	77,945		
Feb.	59,813	106,456	94,473	82,835	105,006	102,720	69,187		
Mar.	66,575	107,667	104,882	103,648	99,685	108,900	51,468		
Apr.	70,550	107,592	111,165	109,607	82,607	91,327	39,768		
May	73,015	108,422	110,238	111,175	68,002	96,312	39,394		
June	79,361	107,053	109,002	110,793	70,495	101,451	35,494		
July	82,691	104,017	107,820	110,354	78,340	98,931	27,889		
Aug.	89,666	103,346	104,772	109,341	88,496	101,529	30,780		
Sept.	95,085	106,745	104,465	113,942	82,932	104,310	32,850		
Oct.	100,822	113,189	106,550	112,482	60,115	106,212	40,215		
Nov.	101,244	110,394	106,859	111,802	79,745	97,830	47,183		
Dec.	103,333	102,537	92,997	110,762	84,944	87,222	.....	

No furnaces were blown out during November. Among the furnaces blown in were the following:

Nos. 6 and 8 Lackawanna furnaces and Buffalo B. furnace in the New York district; one Lock Ridge furnace in the Lehigh Valley; Keystone furnace in the Schuylkill Valley; Robeson furnace in the Lebanon Valley; Nos. 2 and 4 Carrie furnaces and the J and No. 4 Edgar Thomson furnaces of the Carnegie Steel Co., one furnace of the American Steel & Wire Co. and one Monongahela furnace of the National Tube Co., all in the Pittsburgh district; Newcastle No. 1 furnace of the Carnegie Steel Co. in the Shenango Valley; Adrian furnace in western Pennsylvania; No. 2 Ashland furnace in Kentucky; Nos. 3 and 4 Mingo furnaces of the Carnegie Steel Co. in the Wheeling district; No. 2 Ohio furnace of the Carnegie Steel Co. in the Mahoning Valley; one furnace of the National Tube Co. and No. 3 River furnace in northern Ohio; one Iroquois furnace and No. 11 Gary furnace in the Chicago district; one Mayville furnace in Wisconsin and the A furnace operated by the M. A. Hanna Co. in Michigan.

Output by Districts

The accompanying table gives the production of all coke and anthracite furnaces for November, and the three months preceding:

Pig Iron Production by Districts, Gross Tons				
	November (30 days)	October (31 days)	September (30 days)	August (31 days)
New York	91,535	65,502	50,970	44,948
New Jersey	4,525	4,745	4,370	4,689
Lehigh Valley	30,020	27,614	27,566	33,014
Schuylkill Valley	35,850	28,176	23,126	20,735
Lower Susquehanna and Lebanon Val- leys	19,356	20,581	21,903	23,939
Pittsburgh district	337,851	295,741	250,128	255,274
Shenango Valley	50,555	35,430	8,649	none
Western Penna.	67,432	61,742	60,073	47,565
Maryland, Virginia and Kentucky	14,754	15,827	16,046	15,470
Wheeling district	44,966	36,520	18,706	18,076
Mahoning Valley	165,562	157,512	125,705	111,722
Central and North- ern Ohio	156,767	140,914	110,327	83,552
Southern Ohio	13,893	14,485	8,200	3,548
Illinois and Indiana	252,566	229,009	171,380	191,658
Mich., Minn., Mo., Wis., Colo. and Wash.	20,059	11,940	14,641	27,304
Alabama	108,125	99,948	73,739	72,699
Tennessee	1,665	990	none	none
Total	1,415,481	1,246,676	985,529	954,193

Capacities in Blast Dec. 1

The following table shows the number of furnaces in blast Dec. 1 in the different districts and their capacity, also the number and daily capacity in gross tons of furnaces in blast Nov. 1:

Coke and Anthracite Furnaces in Blast					
Location of Furnaces	Total Stacks	Dec. 1		Nov. 1	
		In Blast	Capacity per Day	In Blast	Capacity per Day
New York:					
Buffalo	22	9	3,385	6	2,185
Other New York	4	1	215	1	180
New Jersey	4	1	150	1	150
Pennsylvania:					
Lehigh Valley	18	4	1,040	3	985
Spiegel	2	0	.....	0	.....
Schuylkill Valley	15	3	1,195	2	910
Lower Susquehanna	10	1	420	1	480
Lebanon Valley	8	2	335	1	180
Ferro	2	0	.....	0	.....
Pittsburgh District	55	26	12,700	20	9,700
Ferro and Spiegel	4	1	115	1	125
Shenango Valley	19	4	1,685	3	1,140
West. Pennsylvania	26	6	2,245	5	1,665
Maryland	6	1	345	1	480
Wheeling District	15	5	2,190	3	1,410
Ohio:					
Mahoning Valley	27	12	5,715	11	5,235
Central and Northern	26	11	5,470	9	4,540
Southern	16	2	465	2	465
Illinois and Indiana	42	16	9,000	14	7,270
Mich., Wis. and Minn.	11	3	1,065	1	385
Colorado and Missouri	6	0	.....	0	.....
The South:					
Virginia	16	0	.....	0	.....
Kentucky	7	1	270	0	.....
Alabama	41	10	3,605	10	3,330
Tenn., Ga. and Texas	16	1	55	1	35
Total	418	120	51,665	96	40,850

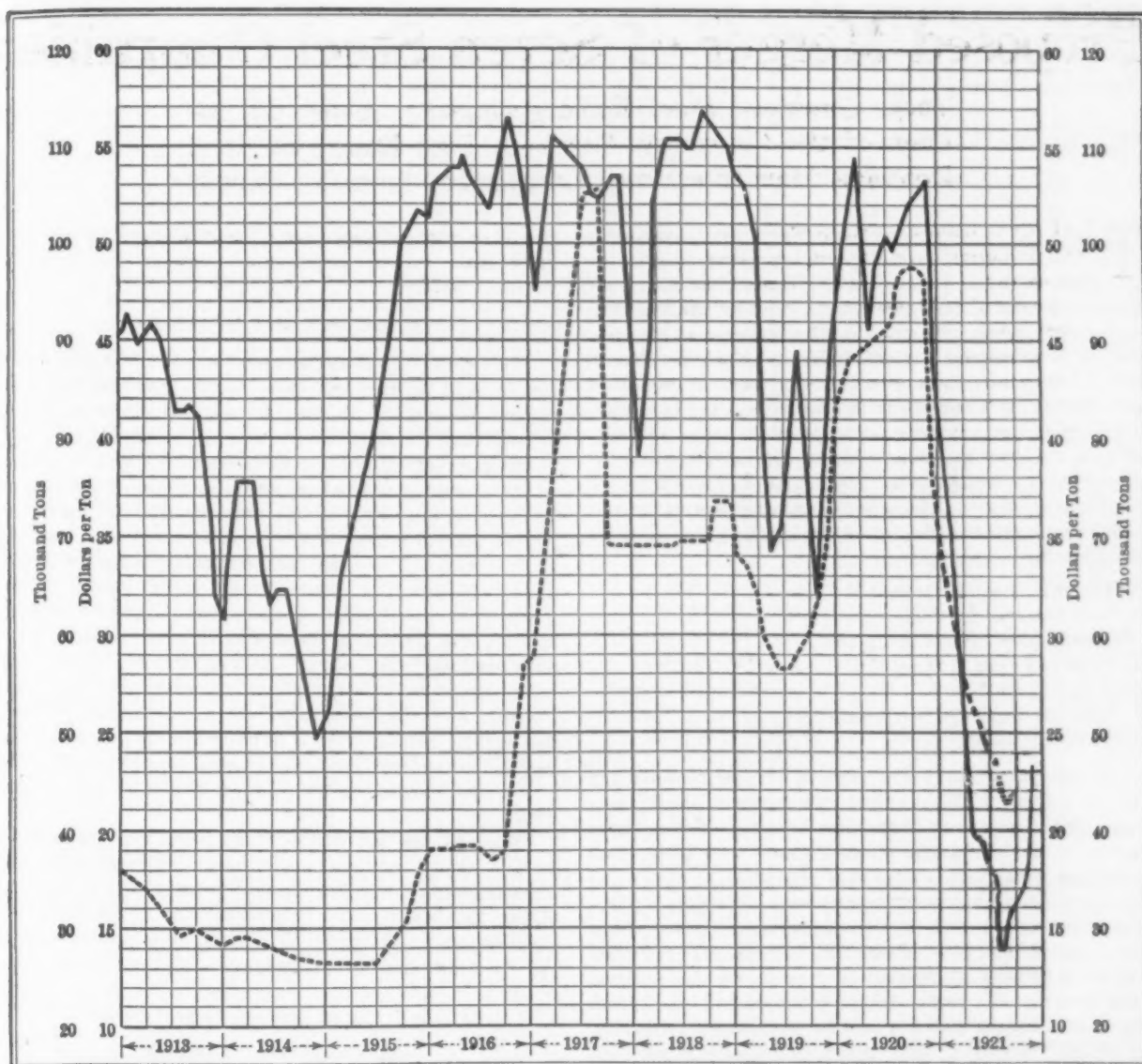
Production of Steel Companies—Gross Tons

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies, as well as from merchant furnaces producing ferromanganese and spiegeleisen, show the following totals of steel making iron, month by month, together with ferromanganese and spiegeleisen. These last, while stated separately, are also included in the columns of "total production."

Production of Steel Companies—Gross Tons									
	Total Production			Spiegeleisen and Ferromanganese					
	1919	1920	1921	1919	1920	1921			
Jan.	2,430,022	2,232,455	1,932,159	32,787	23,957	22,228			
Feb.	2,209,470	2,181,679	1,625,695	28,105	28,038	29,013			
Mar.	2,277,507	2,480,668	1,323,443	26,644	35,275	41,294			
Apr.	1,838,677	1,968,542	1,015,621	17,308	27,628	24,310			
May	1,586,805	1,128,720	1,024,678	14,604	33,407	9,232			
June	1,655,944	2,209,770	883,312	14,254	34,751	4,536			
July	1,906,604	2,230,567	715,664	14,805	36,789	5,524			
Aug.	2,108,566	2,254,943	807,144	17,419	36,985	3,878			
Sept.	1,828,613	2,247,250	815,692	20,631	39,546	3,289			
Oct.	1,295,690	2,393,644	1,034,312	20,238	34,786	3,902			
Nov.	1,727,656	2,150,075	1,138,789	19,964	26,944	3,525			
Dec.	1,916,249	2,047,167	.....	15,718	28,023	.....		

Diagram of Pig Iron Production and Prices

The fluctuations in pig iron production from 1913 to the present time are shown in the accompanying chart. The figures represented by the heavy line are those of daily average production by months of coke and anthracite iron. The dotted curve on the chart represents monthly average prices of Southern No. 2



The Full Line Represents the Daily Production of Pig Iron and the Dotted Line Is the Average of the Price Per Ton of No. 2 Southern Pig Iron at Cincinnati, Local No. 2 Iron at Chicago and No. 2X Iron at Philadelphia

foundry pig iron at Cincinnati, local No. 2 foundry iron at furnace in Chicago, and No. 2X at Philadelphia. They are based on the weekly quotations of THE IRON AGE.

Production of Coke and Anthracite Pig Iron in the United States by Months, Beginning Jan. 1, 1917—Gross Tons

	1917	1918	1919	1920	1921
Jan.	3,150,938	2,411,768	3,302,260	3,015,181	2,416,292
Feb.	2,656,247	2,319,299	2,940,168	2,978,879	1,937,257
Mar.	3,251,352	3,213,091	3,090,243	3,375,907	1,595,522
Apr.	3,334,960	3,288,211	2,478,218	2,739,797	1,193,041
May	3,417,340	3,446,412	2,108,056	2,985,682	1,221,221
June	3,270,055	3,323,791	2,114,863	3,043,540	1,064,833
July	3,342,438	3,420,988	2,428,541	3,067,043	864,555
Aug.	3,247,947	3,389,585	2,743,388	3,147,402	954,193
Sept.	3,133,954	3,418,270	2,487,965	3,129,323	985,529
Oct.	3,303,038	3,486,941	1,863,558	3,292,397	1,246,676
Nov.	3,205,794	3,354,074	2,392,350	2,934,908	1,415,481

11 mos. 35,303,063 35,072,430 27,949,610 33,710,259 14,894,600

Dec. 2,882,918 3,433,617 2,633,268 2,703,855

Ttl. yr. 38,185,981 38,506,047 30,582,878 36,414,114

*These totals do not include charcoal pig iron. The 1920 production of this iron was 323,396 tons.

Blast Furnace Notes

The American Steel & Wire Co., Dec. 5, blew in its second furnace at its Donora, Pa., works. This company now has all four of its blast furnaces in this district in blast. With the Carnegie Steel Co. having 25 of its furnaces on and the National Tube Co. three furnaces in this district active, the Corporation now accounts for 32 of the 53 active furnaces in the Pittsburgh and nearby districts.

Of the 24 furnaces blown in during November, 12 were Steel Corporation furnaces, five were independent

steel making and seven were merchant furnaces.

Of the 24 furnaces blown in during November approximately 15 went in after Nov. 15 and 9 early in the month.

The Steel Corporation Dismantling Its Shipyard at Mobile, Ala.

The United States Steel Corporation has decided to abandon its shipbuilding plant at Mobile, Ala., operated by the Chickasaw Shipbuilding & Car Co., and is disposing of equipment there either by sale or by shipment to other Steel Corporation plants. Connected with the operations at Mobile are also the Chickasaw Utilities Co., which supplies electric current for lighting and trolley purposes, and the Chickasaw Land Co. The Mobile enterprise was entered upon at the request of the Government for the building of ships during the war, and 14 vessels were built, most of them now being in the foreign trade of the Steel Corporation. The Chickasaw Shipbuilding & Car Co. will continue to operate the large car plant completed this year at Fairfield, Ala., adjoining the structural mill of the Tennessee Coal, Iron & Railroad Co.

It is the purpose of the Steel Corporation to continue all the activities of the Federal Shipbuilding Co., which operates a shipyard and repair plant at Kearny, near Newark, N. J. The shipways at this yard were extended last year so as to permit the construction of ships 500 ft. in length, and in the past year a floating dry dock of 10,000 tons capacity has been installed for use in repairing vessels.

Proposed Merger of Seven Steel Companies

Their Combined Steel Making Capacity About 20 Per Cent of the Country's Total—A Full Range of Steel Products from Integrated Companies—Iron Ore Supply

THAT seven important independent steel companies will be merged in a corporation second in producing capacity to the United States Steel Corporation is a probability in view of information made public in the past week. Thomas L. Chadbourne, of the law firm of Chadbourne, Babbitt & Wallace, 14 Wall Street, New York, made a statement to the press to the effect that several independent steel companies are considering a plan for arriving at a possible basis for consolidation; that he was working with the companies upon such a plan, but that the matter is now only in a preliminary stage. The seven companies whose merger is contemplated are the following in the order of their steel making capacity:

Midvale Steel & Ordnance Co.
Lackawanna Steel Co.
Youngstown Sheet & Tube Co.
Republic Iron & Steel Co.
Inland Steel Co.
Steel & Tube Co. of America.
Brier Hill Steel Co.

In the past two years reports of negotiations for the consolidation of various independent steel companies have come out from time to time. From three to five of the companies named above have been mentioned in connection with these reports. At times the Bethlehem Steel Corporation has been named as a probable member of such a consolidation; at other times the Jones & Laughlin Steel Co. It can be said that neither of these companies is a party to the present negotiations. A consolidation composed of the seven companies named above would have an annual capacity of 10,129,000 tons of steel ingots, or roundly 20 per cent of the country's total ingot capacity.

Appraisals Being Made

It is understood that several meetings have been held of men prominently connected with the seven companies, and that appraisals of the various properties are now in progress. Naturally, the basis on which the various companies shall enter the consolidation is a matter on which there will be considerable variation in the estimates of the different interests. The question of financing is not expected to involve great difficulties, as there will not be large requirements of new capital. What will take time and much negotiation will be the exchange basis for the stocks of the different companies. Probably the consummation of the present plans, if they should be successful, will be a matter of several months.

With three large plants in the Youngstown district, two in the Chicago district, one at Buffalo and the operations of the Midvale company carried on in both eastern and western Pennsylvania (Johnstown, Coatesville and Nicetown) the consolidation would have the advantage of a number of strategic locations. In particular the inclusion of the Inland Steel Co. and the Steel & Tube Co. of America, which have nearly all the merchant steel capacity in the Chicago district outside of the Steel Corporation, would give the consolidation the same access to Western markets which the building of the Gary plant was intended to secure for the Steel Corporation. For some time it has been known that a proposal for the merging of the Youngstown Sheet & Tube Co., the Inland Steel Co. and the Steel & Tube Co. of America was under negotiation,

but it is now believed that these three companies will participate in the larger plan each on its own individual footing.

Advantages of Consolidation

The great consolidation movement of 20 to 22 years ago, it will be recalled, came on the heels of the prolonged depression of the late eighteen-nineties. The trying time through which the steel industry is now passing, bringing with it as one phase the elimination of Pittsburgh price basing on a considerable amount of business being done in the Chicago district, has furnished one incentive to the consideration of a merger of interests. The high transportation costs of to-day give the Steel Corporation, with large plants in the Pittsburgh and Valley districts, in Chicago territory and in the South, a considerable advantage. Those who seek to bring about the new merger regard the reduction of overhead, through the unifying of organizations, and the benefits of mass production through the use of certain plants for continuous runs, as important considerations. Both have been exemplified in a marked degree in the United States Steel Corporation.

Most of the seven companies have been associated in the export trade through stock ownership in the Consolidated Steel Corporation which was organized under the Webb act. Combining the seven into one corporation would give an increased advantage over the existing export arrangements of the independent companies, through the concentration of export business in certain forms of product at particular plants.

Ingot Capacities Included

In the table below the ingot capacities of the different companies are set down, and comparison is made with the ingot capacity of the United States Steel Corporation, also that of the Jones & Laughlin Steel Co., the Bethlehem Steel Corporation and the Colorado Fuel & Iron Co., the three important independents not included, as well as with that of the various smaller independent companies that are not in the plan.

	Ingot Capacity Gross Tons	Per Cent of Country's Total
Midvale Steel & Ordnance Co....	2,894,000	5.74
Lackawanna Steel Co.....	1,840,000	3.65
Youngstown Sheet & Tube Co..	1,500,000	2.98
Republic Iron & Steel Co.....	1,395,000	2.77
Inland Steel Co.....	1,000,000	1.98
Steel & Tube Co. of America....	900,000	1.79
Brier Hill Steel Co.....	600,000	1.19
Total	10,129,000	20.10
United States Steel Corporation	22,700,000	45.00
Bethlehem Steel Corporation....	3,217,000	6.38
Jones & Laughlin Steel Co.....	2,640,000	5.24
Colorado Fuel & Iron Co.....	1,138,000	2.26
Other steel companies.....	10,620,000	21.02
Total for the country.....	50,444,000	100.00

The Steel Corporation's ingot capacity of 22,700,000 tons is considered to represent roundly 45 per cent of the country's total ingot capacity. On that basis the ingot capacity of the country is 50,444,000 tons. Some estimates would give a somewhat higher figure, but 45 and 55 may fairly be taken to represent the Steel Corporation, and the independent percentages, the 50,444,000 tons standing for a practically attainable capacity, as distinguished from a theoretical capacity. It will be seen that the Steel Corporation and the pro-

posed consolidation would take in 65 per cent of the country's capacity, with Jones & Laughlin having 5.24 per cent, the Bethlehem Steel Corporation 6.38 per cent, the Colorado Fuel & Iron Co. 2.26 per cent, and all the remaining independents, large and small, 21.02 per cent.

The pig iron capacity of the seven companies, represented by 54 blast furnaces, foots up 8,335,000 tons according to the figures of the Iron and Steel Works Directory of the United States.

Full Range of Finished Products

In finished material the consolidation would have a capacity of 7,698,040 tons, reckoning that finished steel output is 76 per cent of ingot output, an average established by the statistics of a number of years, apart from 1917 and 1918 when the large discard from war-steel ingots made the percentage yield of finished material smaller than usual.

The seven companies represent the whole range of finished material products except tin plate. Undoubtedly a tin plate plant would be provided through extensions in connection with the very considerable sheet mill capacity existing in the Youngstown district.

Without going into detail as to the rolling capacity of the various companies in the different lines of finished material the facts in general concerning the markets in which they chiefly compete are these:

Midvale and Lackawanna have rail mills and Inland is now completing a rail mill which will figure in the rail trade of 1922. All seven companies have plate mills, the most important of these in the sheared plate trade being the Coatesville mill of Midvale. Structural shapes are rolled by Midvale, Lackawanna and Inland. Republic, Lackawanna and Midvale lead in the production of bars, while Inland and Youngstown Sheet & Tube also have considerable bar capacity. Youngstown Sheet & Tube and Inland have been the principal producers of sheets, but Brier Hill is also a good sized factor in the sheet market, and the Republic in 1919 acquired the sheet mills of the Deforest Sheet & Tin Plate Co., of Niles, Ohio. In wire products the Youngstown Sheet & Tube Co. and the Cambria works of Midvale have figured in an important way. Lackawanna also is a producer of wire rods. In wrought pipe Youngstown Sheet & Tube, Republic and the Steel & Tube Co. of America are the largest of the independent producers. Some of the plants of the seven companies roll billets and sheet bars for the market, and in addition to the leading forms of finished material mentioned above the consolidation would have a great range of smaller products such as rivets, nuts and bolts, spikes and miscellaneous track supplies, besides a variety of cold rolled and cold drawn products.

In coke supply the consolidation would be substantially self-contained. Most of the seven companies have large coal mining operations and holdings of coal lands.

Iron Ore Supply

The survey of iron ore supplies represented in the holdings of the seven companies is probably one of the most important of the preliminaries engaging the attention of the consolidation promoters. Expressed in terms of the respective pig iron capacities of the companies, the life of their iron ore reserves ranges from 10 years in the case of one company to probably 30 years in the case of the company having the largest total of ore. There are large holdings in the Lake Superior region, principally on the Mesaba range, though four of the companies are well represented on the older ranges also.

When the United States Steel Corporation was formed it acquired the Rockefeller ore holdings on the Mesaba range and also the Oliver interests in the Oliver Iron Mining Co. There are no large outside

holdings available to-day apart from those of the Mesabi Iron Co. and of various merchant ore firms at Cleveland. The Mesabi Iron Co. has very large deposits of magnetite on the Mesaba range and has built an extensive sintering plant, which in the past two years has made it a factor in the merchant ore trade. Its properties have been estimated to represent 500,000,000 to 600,000,000 tons. The Midvale company is now presumed to have some interest in the Mesabi Iron Co., five of its directors being on the board of the latter. Midvale has some 300,000,000 tons of ore in the Buena Vista group on the northeast coast of Cuba, similar to the clayey Mayari ores of the Bethlehem Steel Corporation, but nothing has been done thus far in their development. Pickands, Mather & Co., of Cleveland, have close ore connections with the Youngstown Sheet & Tube and the Lackawanna companies. The Cleveland firm also has extensive Lake Superior properties a part of whose output is under contract to the two companies named.

From the summation given above, of the forms of finished steel produced by the seven companies, it will be seen that any consolidation that may be formed will be on the vertical rather than the horizontal order. That is to say, a variety of products is turned out by each company, all being integrated from the ground up. There is thus no chance of any counterpart of the Steel Corporation's sheet subsidiary, or its wire or wrought pipe subsidiary. The analogy is rather with the Carnegie, Illinois and Tennessee subsidiaries of the Steel Corporation.

Will Hold Another Conference on Ore, Coal and Coke Rates

WASHINGTON, Dec. 6.—Relationship between reduced rates on ore from Lake Erie ports to interior furnaces and prevailing coal and coke rates to lake front furnaces will be the subject of another conference to be held here to-morrow afternoon with members of the Interstate Commerce Commission. The meeting has been called by the second division of the commission, consisting of Commissioners Daniels, Esch and Campbell, which has charge of the sixth section of the commerce act allowing the commission to permit railroads to put rates into effect upon short notice, instead of 30 days as is ordinarily required.

The carriers have sought permission to extend the time of application of lowered ore rates from Jan. 1 to March 31, which is opposed by some lake front interests in view of the fact that the latter have not been given lower rates on coal and coke. They, together with iron and steel interests favoring the extension and railroads, will be represented at the conference. If the extension suggested as the result of the recent conference in New York is to become effective, it will be necessary for carriers to get permission to put the new tariff into effect upon short notice.

Meanwhile Buffalo iron and steel producers are withholding the filing of their formal complaint against the rates on coal and coke. The complaint asks for the establishment of just, reasonable and non-prejudicial rates on coal and coke and of minimum rates on iron ore.

Postpones Lighting Stack

YOUNGSTOWN, Dec. 6.—The Trumbull-Cliffs Furnace Co. has definitely postponed, for the time being, the lighting of its new 600-ton stack at Warren, erected along the Mahoning River across from the open-hearth department of the Trumbull Steel Co. The latter interest has bought 3500 tons of basic pig iron at \$19, furnace.

The National Enameling & Stamping Co. has purchased 50 acres adjoining its steel works in Granite City, Ill., supplementing a previous purchase of 150 contiguous acres. The price paid for the 50 acres was \$48,500.

Industrial Waste Discussed by Engineers

Deficiencies of Management, Particularly the Financial, the Subject of Papers at Annual Meeting of American Society of Mechanical Engineers

"AMERICA is the most wasteful of all nations," said President E. S. Carman in his remarks opening the first session of the forty-second annual meeting of the American Society of Mechanical Engineers begun in New York, Dec. 5. "Although we accomplish results," he added, "we accomplish them regardless of the waste involved." He said that the main theme of the entire meeting, which will last through Friday, Dec. 9, would be the elimination of waste in industry, a subject he regarded as representing one of the greatest problems confronting the American people to-day. The fundamental basis of the elimination of waste was, he said, largely a matter of management.

The program was made up by the division of management and L. P. Alford, a vice-president of the society and chairman of that division, presided. The responsibility of management, particularly financial management, in the matter of eliminating waste was discussed in a paper by E. F. Du Brul, general manager of the National Machine Tool Builders' Association, Cincinnati. The title of the paper was, "Saving Financial Waste—the Biggest Waste of All."

Responsibility of Financial Management

"Most of the discussions on waste," he said, "seem to be concerned with wastes of productive effort, wastes of material and loss of operating efficiency. Occasionally some one touches on the waste due to idleness of plants in times of depression. Many production men seem to lay this idleness to the sales department's inability to secure orders. Seemingly few men are prepared to challenge the necessity of the greater part of this waste and few seem to challenge the department of business within whose province that avoidable waste occurs. It does not seem logical to worry so much as we do about wastes in cost of production to the end of saving even considerable sums in such waste elimination, if industry is to throw away all these savings and greater sums besides that were previously accumulated as profits and still other sums represented by original invested capital."

All this sort of waste has occurred lately, he pointed out, as it has in every industrial depression we ever had. Putting the question as to which element in the organization of business is responsible for this loss and whose duty it is to study the situation and minimize the evil, he pointed out that it was the management that must bear the responsibility, "since management, particularly financial management, is the element whose policies must be followed by the production and sales departments."

"Students of the subject," said Mr. Du Brul, "come inevitably to the conclusion that bad judgment of managers is the most potent contributing cause of the excessive heights of booms and the consequent excessive depths of depression. Management cannot eliminate all undulations in business but it can and must eliminate the excessive movement that is due to those controllable causes that lie in the province of management to control. Management is therefore very properly on trial before the bar of public opinion."

"The fire waste of our country, of a half billion dollars a year, receives comment and discussion merely because organized forces call the public's attention to those losses and advocate remedies," he continued, "but what organized force is crying from the housetops against financial waste? The record of failures in ten months shows a greater waste than the year's fire waste. Liabilities of failed concerns amounted to \$591,000,000 in the first ten months of 1921. How much more waste was incurred, such as loss of useful

value, loss in inventories and loss in profits in concerns that did not reach the bankruptcy courts?"

How Financial Losses May Be Reduced

As to the management shirking the responsibility for such waste by saying that it can only guess blindly, he said that it is essentially a function of management to do more than make blind guesses. "It is," he said, "within the power of management to secure such information as makes possible a fairly intelligent estimate of demand instead of a blind guess." The reason why management had not done better in avoiding much of this financial waste was, he said, "because managers have not chosen to co-operate, as they must, in the study of actual facts as to demand and supply of the commodities they produce. They have refused to divulge necessary information on consumption, production, stocks on hand, and orders received for three reasons: First, they have not known the value of such statistics to themselves; second, they fear that the statistics of a whole industry might in some way hurt their individual chance of success; and third, they have not known how to use such statistics, if and when they were available."

"Such information can be gathered, and it is being gathered by trade associations in some lines of business. It should be gathered and composite statistics published for every line of industry. No manufacturer of consequence can better protect his business than to contribute his quota of information about his industry. With such information made available and properly used, over-enthusiastic promotion can be minimized, for one thing, and ignorant competition avoided for another. Without such composite information an industry can only run blindly into disastrous financial waste."

"Production men desire to run shops full up, to show the least possible unit cost. In times of low demand, whole industries pursue that policy and the result is a sure maladjustment that causes financial waste in large amounts. Without the light of facts, the enthusiastic salesman is allowed to overstock dealers beyond their final ability to pay, to the ruin of the dealer and perhaps of the manufacturer, who has provided plant facilities in socially-wasteful excess of actual consumer demands. Some men are promulgating as a new gospel of business that the end of business must be service, not money; production, not profit. But there are a few basic human facts, whose continued existence proves the untruth of the new doctrine. The sole object of business is profit. It can have no other object. Unless it makes a profit it dies. The new apostles of service mistake the means for the end. Service is the means of gaining profit. No profit can be gained unless the service offered is actually in demand."

"The controlling factor in management is, and must be, the financial factor, because that factor alone assumes the final responsibility, stands the losses and gets the profit, when there is one. The financial factor, therefore, must tell the production and the distribution factors when to go, how far to go and when to stop. The financial factor must know that the financial tides are ceaselessly moving up and down, and must study the fundamental causes of these movements."

What Management Needs to Learn

Referring again to the wastefulness of business depressions, he said:

"The causes of these extremes have been studied and the results of these studies have been made avail-

able, but management has not availed itself of the information. Many men who could increase the value and body of this knowledge have refused to do so.

"Many managers base production policy on a fallacious idea of getting a steady normal business that does not change either in the amount of demand or in the varying costs that inevitably come about with changing business conditions. They seem to think that this 'normal' of their dreams must coincide exactly with the maximum theoretical production of which their plants are capable. Such dreams have caused large losses and great misery.

"Management must study why some things, perfectly proper at one stage of a business cycle, are absolutely wrong at another stage. Management must learn that there are underlying economic laws, not man made, but inherent in human nature; laws that can be violated with impunity no more than can the laws of physics. Unless management conducts operations in harmony and conformity with them, the end is inescapable disaster. The study of the business cycles and the causes and effects of different changes in business conditions require that management freely contribute the statistical data that alone makes the study possible. Management must then also learn how to use the information, learn what to do and what not to do in the various stages of a cycle.

"Management that will not co-operate in the collection, analysis and dissemination of these facts and will not co-operate in the general education of the public as to their significance and use is shirking a most pressing responsibility to society in general and to its own investors in particular. Only by co-operation of competitors can these facts be gathered. In industries that are doing this now, through their trade associations, some managers have learned how to use their information and their enterprises are not suffering to the same extent as those of their ignorant competitors. But all do suffer from the crass fatuous ignorance that is entirely too prevalent. This one thing is possible and profitable for management to undertake. Unless it be undertaken it is certain that the financial strain on industry will become increasingly greater with each recurring cycle."

Incentives for Preventing Industrial Wastes

Fred J. Miller, past president of the society and member of the American Engineering Council's committee on the elimination of waste in industry, in charge of the inquiry into the metal trades, dwelt on the incentives for the prevention of wastes in industry. Industry's chief problem was perhaps, he pointed out, to conserve, develop and make use of the natural desire of the individual to be accomplishing something, and further, to relieve workers, so far as possible, from such conditions of work as are deadening to ambition, to initiative and to creative instinct. "Far more can be done along that line," he said, "than may seem possible at first sight."

Classifying incentives into penalties and rewards, he pointed out that the two differed widely in their nature, but emphasized the idea that they differ no more than the results that are obtained by them. The reward class was further subdivided into group-reward and individual-rewards. Group incentives included profit sharing, group insurance, employee representation or bonuses paid to all employees alike, etc. Individual incentives were understood to include individual increase of wages, piece work, bonuses to individuals for specific personal attainments, etc.

As to which of these incentives should be employed, Mr. Miller gave it as his belief that after establishing good working conditions in the line of proper light, heat, ventilation, sanitary and safety measures and also including foremen and other executives who have been selected and trained to take an enlightened and human attitude toward employees—after these conditions were met, the rest of the way to the best possible general results was through individual reward incentives. In this connection he said that individual rewards can be applied intelligently only when means are provided for having a continuous record of every employee's performance with reference to established standards.

In connection with enlisting co-operation of the workers he said that there has been some tendency to over-elaboration in certain of the measures taken to overcome our industrial difficulties. "I still have faith," he said, "in the comparatively simple means of enlisting the enthusiastic co-operation of minor executives and employees and an essential part of this is to give them such treatment as every man likes to receive from those with whom he comes in contact; always remembering that work people are not essentially different from other people; are at least as readily responsive to candid, fair and courteous treatment as are other people and also as well able to judge whether or not they are receiving it.

Industries to be Directed by Engineers

Defective administrative methods was given as a major cause of waste, and as to the adoption of better methods and practices he said that "on the one hand we see employers who are too easily prevailed upon by charlatans to take up methods that are little better than a group of unrelated 'stunts' and on the other hand, those who always delay progress along new lines until pretty nearly every one else is far in advance of them. It is the work of engineers to educate and to show the better ways, and my prediction is that as time goes on our industries will be more and more directed by engineers who know how to direct them for production and who will regard production and service as the prime objects to be attained by an industrial organization. When this change has been effected, one of the greatest causes of waste will have been removed. I could mention entire industries that are in the control of men who are little if at all interested in production, but devote their entire time to high finance.

"It would, I think, surprise a great many of us if we could know just how much of the wastes of industry that are caused by careless, inefficient work, have a deeper underlying cause in a feeling created by the conditions under which men work, that make them believe they cannot do what they should do, and for reasons entirely beyond their control.

"Especially do we need to adopt such methods of management as will enable the facts to be fairly presented to both sides in every difference that arises between employer and employee; and experience shows that when we have done that, both the employer and the employee are far more reasonable and considerate than either usually imagines the other to be. Production has been and is restricted by workers, both organized and unorganized, and most of such restriction is wrong economically if not ethically.

Many Conditions Which Restrict Production

"In most industries, however, I think it can easily be shown that restriction of production by workers is insignificant compared with the restrictions caused by financial juggling of one kind or another; by avoidable irregularity of employment of labor and of plant by presidents or managers who are temperamentally unable to make decisions and stick to them, or are unable to do so because they are under the control of men 'higher up' who knew nothing of industrial science, or even that there is any such thing; by unnecessarily large inventories and consequent tying up of capital that could be otherwise usefully employed; by inadequate control of the movement of material through the works from one operation to another and from inadequate, or entire absence of provision for teaching or training operators and minor executives; absence of effective means of recording attainments of workers, foremen, etc.

"In other words, the greatest and most effective incentive for the prevention of industrial wastes is disarmament, so to speak; the cultivation of friendly relations between all those concerned in industrial enterprises; and the maintenance of such a system as will enable every man, from the highest to the lowest, to know what he is responsible for, to whom he is responsible, and that he personally will be credited and rewarded in proportion to service rendered."

Sessions were held on Dec. 6 in continuation of the subject of industrial waste.

Iron and Steel Markets

PIG IRON USED UP

Expansion in Steel Output Forces Many Blast Furnaces to Start

New York Central Rails Placed—Further Car Inquiry—Good Pig Iron Buying

The returns of the country's pig iron output in November indicate plainly that the expansion in steel production in the past two months had made large inroads in pig iron stocks, compelling the rapid blowing in of a good many iron furnaces.

Last month's output was 1,415,481 tons, or 47,183 tons per day, against an October total of 1,246,676 tons, or 40,215 tons per day. The November rate represents 2,500,000 tons more per year than that of October. Twenty-four furnaces were blown in in November and none went out. The capacity active Dec. 1 was 51,665 tons per day for 120 furnaces, against 40,850 tons per day for 96 furnaces on Nov. 1.

The Steel Corporation blew in 12 furnaces, or half of those that started in November, and the independent steel companies 5, the remaining 7 being merchant stacks.

The steel trade is taking great interest in the plans for merging seven important independent companies, all integrated, and representing every form of rolled products except tin plate. The consolidation would have about 20 per cent of the country's steel capacity, while the Steel Corporation has 45 per cent. As bearing on the Government's attitude, it is recalled that in wartime the Midvale consolidation and that of Bethlehem, the two taking in 12 per cent of the total capacity, were passed without protest. The new combine would have a larger share of the country's capacity in plates than in any other product.

Except for demand from the railroads, car builders and shops doing tank work, the market is waiting for the impetus of January, or possibly February. The Steel Corporation is still running at something above 50 per cent. Tin plate mills are particularly busy and their winter operations will be on a larger scale than in several years.

Recently the leading producer took orders for 2,500,000 boxes for the Pacific Coast, in view of which the 150,000 boxes the Welsh mills got at Vancouver scarcely indicate the recapture of the coast market by the British.

Allocation of 125,000 tons of rails has practically been completed by the New York Central and options taken for 25,000 tons in addition. It appears likely that 80 per cent of the total will be divided nearly equally between the Lackawanna Steel Co. and the United States Steel Corporation and the remaining 20 per cent among three or four companies, including the Soo rail mill, which will supply Canadian branch lines.

The Pennsylvania Co.'s call for bids on 150,000 tons of rails is expected this month. The Burlington has made tentative reservations for 25,000 tons which will go to Illinois and Colorado mills. Texas & Pacific and Atlantic Coast Line orders amount to 25,000 tons.

Car business keeps up. For the Argentine 2000 cars will be supplied from Middletown, Pa. China, Chile and Spain are also expected to buy American cars. The Pere Marquette has ordered 1000 and the Great Northern has increased its inquiry from 2000 to 3000. The Union Pacific is in the market for 1500 and the C & O for 500.

Seeing that financing is needed, the Argentine order for 40,000 tons of rails is expected to come to this country, in spite of low bids by European mills.

The outstanding fabricated steel award of the week involves 6000 tons for an office building in Philadelphia. Other awards will call for 12,000 tons and fresh fabricating steel work will take 10,000 tons. No up-turn in fabricated steel prices is yet discernible.

In the wire trade activity is looked for after inventory is taken and there are expectations of good buying for the second quarter in view of the promise of new building. From agricultural buying little is expected.

Chicago steel producers are interested in impending reductions in domestic and export freight rates to the Pacific Coast.

Unexpectedly heavy buying of pig iron, especially in the East and in Cleveland and Buffalo, has caused a much more cheerful sentiment in that market. At Philadelphia, about 20,000 tons, divided equally between steel making and foundry grades, has been placed, while in New York, Boston, Cleveland and Buffalo manufacturers of radiators and house furnaces have bought freely. The Pennsylvania Railroad has ordered a larger tonnage than was expected. Prices in eastern Pennsylvania have been well maintained, but some weakness has developed in central Pennsylvania and Buffalo and Southern iron is more freely sold at \$17.50, Birmingham.

German steel prices have gone soaring and the rapid fluctuations in that market have led to quotations on the dollar basis both in export and domestic transactions.

Pittsburgh

PITTSBURGH, Dec. 6.

The close proximity of the end of the year is telling more and more on the demand for steel. Nobody wants to carry over any more tonnage than possibly can be helped into 1922 and current orders and specifications are of lots that can be quickly used. Steel pipe stands out as the one product in which an improved demand is maintained and in the case of line pipe there has been an actual increase in business in the past few weeks. A Middle Western manufacturer is the chief beneficiary of some big line pipe orders recently closed. Railroad buying still is inconspicuous in this district and such activity as is developing in plates is ascribed largely to the demand for oil storage tanks. One maker in this district has taken 20 additional 55,000-barrel tanks for the new Mexia field, which will take 3000 tons of steel. There also has been some activity in steel river craft, one company here having taken 10 steel barges and another 12. Structural activities are dwindling as usual at this time of the year.

Changes in prices are few, but it cannot be said that the general market is any stronger than it has

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics
At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Dec. 6, 1921	Nov. 29, 1921	Nov. 8, 1921	Dec. 7, 1920
No. 2X, Philadelphia...	\$22.34	\$22.34	\$22.84	\$37.79
No. 2, Valley furnace...	20.50	20.50	21.00	37.00
No. 2 Southern, Cin'ti...	22.00	22.50	23.50	42.50
No. 2, Birmingham, Ala.†	17.50	18.00	19.00	38.00
No. 2, foundry, Chicago*	20.00	20.00	21.00	36.00
Basic, del'd. eastern Pa...	21.00	21.00	20.50	35.00
Basic, Valley furnace...	19.00	19.00	19.00	33.00
Bessemer, Pittsburgh...	21.96	21.96	21.96	36.96
Malleable, Chicago*	20.00	20.00	21.00	36.50
Malleable, Valley...	20.00	20.00	20.50	37.00
Gray forge, Pittsburgh...	21.46	21.46	21.96	37.96
L. S. charcoal, Chicago...	31.50	31.50	31.50	51.00
Ferromanganese, del'd...	60.00	60.00	60.00	110.00

Rails, Billets, etc., Per Gross Ton:	Dec. 6, 1921	Nov. 29, 1921	Nov. 8, 1921	Dec. 7, 1920
O.-h. rails, heavy, at mill.	\$40.00	\$40.00	\$40.00	\$57.00
Bess. billets, Pittsburgh...	29.00	29.00	29.00	43.50
O.-h. billets, Pittsburgh...	29.00	29.00	29.00	43.50
O.-h. sheet bars, P'gh...	30.00	30.00	30.00	47.00
Forging billets, base, P'gh	32.00	32.00	35.00	56.00
O.-h. billets, Phila...	34.74	34.74	34.74	49.24
Wire rods, Pittsburgh...	38.00	40.00	40.00	57.00
Skelp, gr. steel, P'gh...	1.50	1.50	1.60	3.00
Light rails, Pittsburgh...	1.55	1.55	1.65	3.00

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia...	1.95	1.95	1.95	4.35
Iron bars, Chicago...	1.65	1.65	1.75	3.25
Steel bars, Pittsburgh...	1.50	1.50	1.50	2.35
Steel bars, Chicago...	1.60	1.60	1.75	2.73
Steel bars, New York...	1.80	1.80	1.80	2.73
Tank plates, Pittsburgh...	1.50	1.50	1.50	2.65
Tank plates, Chicago...	1.60	1.60	1.75	3.03
Tank plates, New York...	1.88	1.88	1.88	3.03
Beams, Pittsburgh...	1.50	1.50	1.50	2.45
Beams, Chicago...	1.65	1.60	1.75	2.82
Beams, New York...	1.88	1.88	1.88	2.83
Steel hoops, Pittsburgh...	2.00	2.00	2.25	3.05

*The average switching charge for delivery to foundries in the Chicago district is 70c. per ton.

†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Sheets, Nails and Wire,	Dec. 6, 1921	Nov. 29, 1921	Nov. 8, 1921	Dec. 7, 1920
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh.	3.00	3.00	2.90	4.35
Sheets, galv., No. 28, P'gh.	4.00	4.00	3.90	5.70
Sheets, blue an'l'd, 9 & 10	2.25	2.25	2.25	3.51
Wire nails, Pittsburgh...	2.75	2.75	2.90	3.25
Plain wire, Pittsburgh...	2.50	2.50	2.60	3.25
Barbed wire, galv., P'gh...	3.40	3.40	3.55	4.10
Tin plate, 100-lb. box, P'gh.	\$4.75	\$4.75	\$4.75	\$7.00

Old Material, Per Gross Ton:

Carwheels, Chicago...	\$16.00	\$16.50	\$16.00	\$27.00
Carwheels, Philadelphia...	17.00	17.00	17.50	27.00
Heavy steel scrap, P'gh...	14.00	14.00	14.50	19.00
Heavy steel scrap, Phila...	11.50	11.50	12.00	16.00
Heavy steel scrap, Ch'go...	11.50	12.00	12.00	16.50
No. 1 cast, Pittsburgh...	16.50	16.50	17.50	28.00
No. 1 cast, Philadelphia...	17.50	17.50	17.50	27.00
No. 1 cast, Ch'go (net ton)	13.00	13.00	13.75	18.50
No. 1 RR. wrot, Phila...	15.50	15.50	16.50	20.00
No. 1 RR. wrot, Ch'go (net)	10.50	11.50	12.50	15.50

Coke, Connellsville, Per Net Ton at Oven:

Furnace coke, prompt...	\$2.75	\$2.75	\$3.00	\$6.50
Foundry coke, prompt...	4.00	4.00	4.25	7.50

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York...	13.75	13.50	13.25	14.00
Electrolytic copper, N. Y.	13.50	13.37½	12.75	14.00
Zinc, St. Louis...	4.87½	4.65	4.75	6.25
Zinc, New York...	5.37½	5.15	5.25	6.60
Lead, St. Louis...	4.45	4.35	4.40	5.00
Lead, New York...	4.70	4.70	4.70	5.00
Tin, New York...	31.75	29.87½	28.62½	35.00
Antimony (Asiatic), N. Y.	4.50	4.50	4.75	6.75

Composite Price, Dec. 6, 1921, Finished Steel, 2.135c. Per Lb.

Based on prices of steel bars, beams, tank plates plain wire, open-hearth rails, black pipe and black sheets	}	.....	These products constitute 88 per cent of the United States output of finished steel.	}	Nov. 29, 1921,	2.135c.
					Nov. 8, 1921,	2.134c.
					Dec. 7, 1920,	3.146c.
					10-year pre-war average,	1.684c.

Composite Price, Dec. 6, 1921, Pig Iron, \$19.47 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham	{	Nov. 29, 1921,	\$19.56
		Nov. 8, 1921,	19.97
		Dec. 7, 1920,	35.13
		10-year pre-war average,	15.72

been, and the absence of business of importance probably explains the lack of price reductions. It is still a buyer's market. There is very little change in the average of steel plant operations in Pittsburgh, due to the fact that so many of the Steel Corporation units are located in this district, and most of them are as well engaged this week as they were last week. The American Sheet & Tin Plate Co. has only 70 per cent of its hot sheet mills in operation as compared with 77 per cent last week, but this loss is partly offset by a higher rate of operation of its tin plate units, of which about 83 per cent are running this week. The American Steel & Wire Co. yesterday put on its second blast furnace at its Donora, Pa., works, and now has all four of its blast furnaces in this district making iron. The Carnegie Steel Co. has 25 blast furnaces on and is averaging about 50 per cent operations of its ingot capacity. Both the National Tube Co. and the independent makers of steel pipe are running well, some of the latter having a rate as high as 80 per cent. Independent sheet makers are not averaging more than 50 per cent and some of the Valley independents have materially curtailed steel works operations this week. One company with 14 open-hearth furnaces has all of them down this week, and the same is true of another company with 12 open-hearth units.

The pig iron market remains excessively dull, and gives signs of weakening on the appearance of any important business.

Curtailed of coke production has not benefited prices because there is so little demand. Continued lack of demand keeps scrap prices down.

Pig Iron.—Outside of a couple of sales of basic iron, one of 4000 tons and the other of 2000 tons, business has been almost negligible. The larger purchase was by a Valley steel company which, it is claimed, took the iron from another Valley steel company, through a middleman, at \$19, furnace. There have been frequent reports that less than \$19 could be done on Valley iron of this grade, but no actual business has been uncovered at a lower figure. The smaller tonnage was taken by a West Virginia melter, the business going to nearby furnaces at a delivered price which would figure back to less than \$18 from Valley furnaces. There has been no important sales of Bessemer iron, which nominally is quoted at \$20, Valley furnaces. Interest in foundry grades also is limited and some producers now are finding difficulty in getting shipping instructions on tonnages already on their books. A few suspensions have actually been asked against December quotations of foundry iron. The average prices of basic and Bessemer iron from Valley furnaces for November, as compiled by W. P.

Snyder & Co., show net sales of basic averaged \$19 and of Bessemer \$20, the same prices as in October.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.96 per gross ton:

Basic	\$19.00
Bessemer	20.00
Gray forge	19.50
No. 2 foundry	20.50
No. 3 foundry	20.00
Malleable	20.00

Ferroalloys.—Slowing down of the operation of a number of independent steel works in this and nearby districts finds reflection in an even more limited demand for ferroalloys than recently was the case. The Carnegie Steel Co. continues a factor in the ferromanganese market, having met the requirements of a number of steel companies over the past three or four weeks, and its price of \$60, Pittsburgh, is much more attractive than that named by commercial producers. The latter quite generally are quoting 80 per cent material at \$58.38, Atlantic seaboard, to which must be added a freight to Pittsburgh, common rate points, of \$5.32, making the delivered price \$63.67. German ferromanganese is coming through on order in normal time of about four weeks, but since imports are entirely on order, there are no stocks to draw upon for prompt shipment and consumers who have contracted for German material sometimes find themselves without sufficient supplies to carry them until a consignment is due. German 80 per cent material is quoted at \$54 c.i.f. Atlantic seaboard, or \$59.32 delivered Pittsburgh, common rate points. There has been no recent business in this district in spiegeleisen and the market for 50 per cent ferrosilicon is extremely limited. Offerings of the latter material, however, have shortened up considerably in the recent past and \$57, furnace, freight allowed, now appears to be as low as any producers will go to secure business.

We quote 78 to 82 per cent domestic ferromanganese at \$60 to \$63.67 delivered; 78 to 82 per cent foreign ferromanganese, \$58.35, c.i.f. Atlantic seaboard; German, \$54, seaboard. Average 20 per cent spiegeleisen at \$30 delivered, Pittsburgh or Valleys; 50 per cent ferrosilicon, domestic, \$57, freight allowed. Bessemer ferrosilicon is quoted f.o.b. Jackson and New Straitsville, Ohio, furnaces as follows: 10 per cent, \$38.50; 11 per cent, \$41.80; 12 per cent, \$45.10; 13 per cent, \$49.10; 14 per cent, \$54.10; silvery iron, 6 per cent, \$27; 7 per cent, \$28; 8 per cent, \$29.50; 9 per cent, \$31.50; 10 per cent, \$33.50; 11 per cent, \$36; 12 per cent, \$38.50. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is \$4.06 per gross ton.

Billets, Sheet Bars and Slabs.—Interest in the market remains extremely low, due to the fact that finishing mills, with the exception of those making tin plate, are not very well off in the matter of orders, and little new business is developing. The tin plate makers with the largest order books, either make their own bars or are covered by requirement contracts. Possibly the appearance of a really attractive order for sheet bars would bring out a price of less than \$30, but one Pittsburgh district plant, which operated practically full in November, and in addition is a low cost unit, was unable to get the cost down as low as \$30. A number of mills which roll billets into bars and slabs into plates and skelp are able to buy the finished products for less than it would cost to make them and consequently are not interested in semi-finished material.

We quote 4 x 4 in. soft Bessemer and open-hearth billets at \$28 to \$30; 2 x 2 in. billets, \$30; Bessemer and open-hearth sheet bars, \$30; slabs, \$30; forging billets, ordinary carbons, \$32 to \$35, all f.o.b. Youngstown or Pittsburgh mills.

Wire Rods.—The market is weaker, chiefly as a result of the failure attending the effort to maintain prices announced Sept. 12, last, on wire products. The market on wire rods just prior to that date was as low as \$38 Pittsburgh, for No. 5 soft rods, and now that the prices for nails and wire are back at old levels, consumers of rods feel they should have supplies at prices low enough to get out whole on the going price of the finished products. As low as \$38 has been done recently and we revise our quotations accordingly. Prices are given on page 1510.

Steel Skelp.—Activity still is absent and prices are rather indefinite, with makers holding to 1.60c. and consumers are inclined to regard 1.50c. as the highest price they should pay. It is said that on the basis of what line pipe recently has been sold at, the value of the skelp is considerably below the latter price.

Iron and Steel Bars.—A few small demands for merchant steel bars for quick shipment are coming to makers in this district, but sizable inquiries are lacking, and interest in tonnages for early 1922 delivery is small. An attempt still is being made to maintain 1.60c., but buyers, even on small tonnages, by a little shopping, seldom have to go above 1.50c. The railroads are buying more iron bars than they did earlier in the year, but general business still leaves much to be desired.

We quote steel bars rolled from billets at 1.50c. to 1.60c.; reinforcing bars, rolled from billets, 1.50c. to 1.60c. base; reinforcing bars, rolled from old rails, 1.45c. to 1.50c.; refined iron bars, 2c. to 2.10c. in carloads, f.o.b. mill, Pittsburgh.

Sheets.—Demand is on a diminishing scale, and since most makers have completed such business as they had on their books, mill operations are declining accordingly. Prices recently named by both the American Sheet & Tin Plate Co. and the independents of 3c., base, for black; 4c., base, for galvanized and 2.25c., base, for blue annealed, are well observed. Buyers do not seem to be interested beyond their actual needs, and since these prices allow no profit except on a high rate of operation, there is no tendency on the part of manufacturers to cut them to secure business. In naming prices recently, the American Sheet & Tin Plate Co. established them merely for the first quarter of 1922, and not for the first half, as announced in this column last week. The company will take first half business, but will announce prices for second quarter shipments later on. Prices are given on page 1510.

Tin Plate.—The market is seasonably quiet. Container manufacturers quite generally have entered orders for early 1922 delivery and mill activities are chiefly in making up tonnages which can be moved after Jan. 2. There is fair observance of an established base of \$4.75 on production tin plate, but instances are not lacking where concessions from this figure have been made.

We quote standard production coke tin plate at \$4.75 per base box f.o.b. Pittsburgh for carload lots.

Structural Materials.—Awards not only are few but generally involve only small tonnages. The Jones & Laughlin Steel Co. has taken 150 tons for an addition to the plant of the Erie Brewing Co., Erie, Pa., and 75 tons for an addition to the plant of the Pittsburgh Valve, Foundry & Construction Co., Pittsburgh. The McClintic-Marshall Co. will fabricate 180 tons for a wharf to be constructed at Hilo, Hawaii, by the Hawaiian Dredging Co., and 150 tons for storage bins for the Bronx Equipment Co., Warren, Ohio. The Dravo Contracting Co. has been awarded an emergency dam for the Lake Washington ship canal, Seattle, calling for 400 tons. On business of at all attractive proportions, the plain material market definitely is at 1.50c. base, and some fabricating interests now think they will be able to get an even lower price on later requirements. Prices are given on page 1510.

Plates.—Demands upon mills in this district still are light, although some rather good oil storage tank orders are coming out, and there are orders for barges for which considerable plate tonnage will be required. The Riter-Conley Co. has taken 20 additional 55,000-barrel oil tanks for erection in the Mexia field for which 3000 tons of steel, largely plates, will be required. The Dravo Contracting Co. has taken an order for 10 steel coal barges for the Island Creek Coal Co., Huntington, W. Va., taking 1800 tons of steel, also a steel tow boat for the Joyce-Watkins Lumber Co., Chicago, taking 225 tons, and a steel hull derrick boat for the United States Engineers, Nashville district, involving 100 tons. The American Bridge Co. will build 12 steel barges for the J. K. Davison & Brothers Sand & Gravel Co., Pittsburgh. The Green Bay Dry Dock Co., Green Bay, Wis., was low bidder for four steel dump scows asked for by the Pittsburgh District Federal Engineer's office. Plate prices still range from 1.50c. to 1.60c., but the lower figure is the more common one even on small tonnages.

We quote sheared plates, ¼ in. and heavier, tank quality, at 1.50c. to 1.60c. f.o.b. Pittsburgh.

Iron and Steel Pipe.—Steel pipe stands out as the most active of any of the finished steel products. All makers are getting an unusually good run of merchant

pipe for this time of year, but it is in oil country goods that the greatest activity is noted. Following closely on the recent order of the Pure Oil Co. for about 17,000 tons of 8-in. line pipe, divided between the Mark Mfg. Co. and the Youngstown Sheet & Tube Co., is one of 20,000 tons of 10-in., 8-in., 4-in., 3-in. and 2-in. line pipe by the Sinclair Oil Co. awarded to the Mark Mfg. Co., which in the past few weeks has booked about 35,000 tons of oil country pipe, chiefly line pipe, and this tonnage constitutes a backlog sufficient to engage its lap weld capacity for the next five or six weeks. The Midwest Refining Co recently closed for 3500 tons of casing and other well pipe. There is before the trade an inquiry for 7500 tons of 6-in. line pipe for the Tidewater Oil Co. Prices of steel pipe generally are slightly firmer than they were recently, but still show variation in favor of buyers from the Sept. 16 cards. Business with makers of wrought iron pipe is gaining but not very rapidly, because of the wide difference in prices of iron and steel pipe, in favor of the latter. Discounts are given on page 1510.

Cold-Finished Steel Bars and Shafting.—The most favorable thing that can be chronicled of this line is that stocks in consumers' hands are getting depleted, and even if there is a further contraction in the activities of consuming industries, it is likely to mean more business for manufacturers because of the light stocks. Business is better than it was earlier in the year, but far short of what could be wished. Prices take a wide range on cold-rolled and drawn stocks, going from 2.15c. down to 2c. on the more desirable orders, and up to 2.25c. on small lots. The Cumberland Steel Co., reduced the price of ground shafting \$5 per ton to \$2.50 per 100 lb., base mill, for carloads and \$2.75 for less than carloads, effective Dec. 1.

Hoops and Bands.—There is no increase in the demand nor any strong tendency to prices, which still range from 2c. to 2.25c., base, with 2.15c. the general maximum.

Wire Products.—Buyers are specifying rather well for the time of year, although taking good care not to order beyond what can be immediately used and not add to their inventories. Some inquiry is noted for early 1922 requirements, and the trade is looking for some fair-sized orders after the turn of the year. It is expected that second quarter nail business will be big, due to indications of activity in new building work next spring. The Sept. 12 prices still are quoted, but seldom obtained, the market on sales being back at the levels in effect prior to that date, or \$2.75 base per keg for nails and \$2.50 base per 100 lb. for wire. The outlook for agricultural business is rather unpromising. The farmers still are hard pressed financially. Those who sold their crops had to sell so cheaply that they have only slightly reduced their obligations to the banks and those who still have their crops also are lacking in funds.

We quote wire nails at \$2.75 base per keg, Pittsburgh, and bright basic and Bessemer wire at \$2.50 base per 100 lb., Pittsburgh.

Hot-Rolled and Cold-Rolled Strips.—Both orders and specifications are light and the common report is that business is poorer than since mid-summer. Occasional orders are being secured at 2.25c. base for hot-rolled and 4c. base for cold-rolled, but the more common prices are 2c. and 3.75c., respectively, and there are some sales at even below these figures.

Steel Rails.—The official quotation on light rails of the important producers has dropped to 1.60c., base, but demand is light and competition for passing orders so sharp that this figure is maximum.

We quote 25 to 45-lb. sections, rolled from new steel, 1.55c. to 1.60c. base; rolled from old rails, 1.50c. to 1.55c. base; standard rails, \$40 per gross ton mill for Bessemer and open-hearth sections.

Coke and Coal.—The market on spot furnace coke is not quotable except on small tonnages of high-grade fuel, at higher than \$2.75 per net ton ovens. It is not alone on loaded cars that this price has been done, as there are some small operators, without regular consuming connections, who have been willing to take business, calling for shipment over a week, at that figure. There has been some shutting down of merchant ovens in the Connellsville district, but even with this

decline in production supplies are more than ample for current demand. This also is true in a large measure of foundry coke, which readily is available at \$4 per net ton oven for a really good brand. There is no interest yet in contracts for future shipment. The coal market is dull, with prices nominal, at the levels of a week ago, or \$1.50 for mine run steam, \$1.75 for by-product and \$2.25 for gas grade.

Boiler Tubes.—While business is better now than it was during the first eight months of the year, there still is considerable room for improvement and since there are not enough orders to go around, prices are highly competitive, particularly on steel tubes, both lap-welded and seamless. It is impossible to publish quotations on seamless tubes that would be reliable, because makers are naming prices according to the desirability of the orders presented. Discounts are given on page 1510.

Bolts, Nuts and Rivets.—Activity in nuts and bolts still is lacking in this district, makers finding that buyers are meeting merely their actual requirements and not showing much interest in future needs. There seems to be fairly close adherence to public quotations by makers in this district, but they have lost business as a result of this attitude. The going market on rivets is \$2.40 base for large structural rivets and \$2.50 for large boiler rivets, but on really desirable orders these prices have been shaded about \$3 per ton. The ruling market on small rivets is 70, 10 and 10 per cent off list, but some business also is being entered at higher prices. Regular manufacturers of rivets have been obliged to meet some competition on certain sizes from bolt makers, having heading machines. Prices made by the latter, however, hardly can be recognized as quotations, since they refer to only a few sizes. Prices and discounts given on page 1510.

Spikes.—Demand still is on a tapering scale and prices favor buyers. Only on retail lots is it now possible to obtain more than \$2.25 base per 100-lb. for standard spikes, and \$2.40 base per 100-lb. for small spikes. Prices are given on page 1510.

Old Material.—Business remains extremely slack, but prices are fairly steady as a whole. A Pittsburgh independent steel company recently bought 3000 tons of heavy melting steel at \$14.25 and would pay that price for other tonnages, although its public bid is \$14. Not much material of this grade is coming on the market at current prices for the stocks in dealers' yards carry an average price considerably above today's value, and the railroads are expected to withdraw considerable tonnage unless a price of around \$15 can be obtained. Prices merely are nominal on a number of grades, notably rerolling rails, low phosphorus scrap and turnings, which, although not very plentiful, are not very much wanted at the present time. Important users of turnings in this district all are out of the market at present and this also is true of users of rerolling rails. Steel foundries, in expectation of lower prices, are only nibbling at low phosphorus scrap.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate, as follows:

Heavy melting steel, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh.....	\$14.00 to \$14.50
No. 1 cast, cupola size.....	16.50 to 17.00
Rerolling rails, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va., and Franklin, Pa.	15.50 to 16.00
Compressed sheet steel.....	11.50 to 12.00
Bundled sheets, sides and ends.....	10.50 to 11.00
Railroad knuckles and couplers.....	14.50 to 15.00
Railroad coil and leaf springs.....	14.50 to 15.00
Low phosphorus standard bloom and billet ends	19.00 to 20.00
Low phosphorus plates and other grades	17.00 to 17.50
Railroad malleable	13.00 to 13.50
Iron car axles.....	25.00 to 26.00
Locomotive axles, steel.....	23.00 to 24.00
Steel car axles.....	16.00 to 16.50
Cast iron wheels.....	15.50 to 16.00
Rolled steel wheels.....	14.50 to 15.00
Machine shop turnings.....	9.50 to 9.75
Sheet bar crop ends.....	14.00 to 14.50
Heavy steel axle turnings.....	11.00 to 11.50
Short shovelling turnings.....	10.00 to 10.50
Heavy breakable cast.....	14.50 to 15.00
Stove plate	13.00 to 13.50
Cast iron borings.....	9.50 to 10.00
No. 1 railroad wrought.....	11.50 to 12.00

Chicago

CHICAGO, Dec. 6.

Except for demand emanating from the railroads, car builders and tank fabricators, there is little current market activity. With the approach of the end of the year, buyers wish to keep their stocks at a minimum for inventory purposes. The talk of possible reductions in freight rates is also influencing consumers to postpone purchases. The price situation shows little change. Large inquiries for plates, shapes and bars are still bringing out low quotations, but on smaller business the mills appear to be striving to hold prices to a more stable level. Ordinary tonnages of structural steel placed by fabricators are bringing a minimum of 1.65c., Chicago. In this connection it is to be noted that the reaction upward in sheets has proved successful, all makers holding to 2.25c., 3c. and 4c. base, Pittsburgh, respectively for blue annealed, black and galvanized.

The largest steel order placed during the past week involved 13,000 tons required for 50 80,000-barrel storage tanks to be fabricated by the Chicago Bridge & Iron Co. for the Sinclair Crude Oil Purchasing Co. The Humphrey-Mexia Co. has ordered 15 tanks from the Graver Corporation and is reported to have placed 30 additional with the Chicago Bridge & Iron Co. No further orders for car steel have been reported.

Mill operations are on the same basis as last week.

Local producers are interested in impending reductions in domestic and export rates to the Pacific Coast. The Chicago, Milwaukee & St. Paul has issued a tariff providing for a rate of 50c. per 100 lb. of iron and steel products shipped from Chicago via Northwest Pacific Coast ports to Japan, China and the Philippines. The rate from Pittsburgh territory is fixed at 59c. The tariff is expected to become effective in about 10 days. A similar tariff is being prepared by the Southern Pacific. One of a series of hearings on transcontinental rates on domestic shipments to the Pacific Coast is being held by the Interstate Commerce Commission in San Francisco this week. A blanket rate of \$1 for shipments from all points east of Omaha has been proposed, but this is opposed by local manufacturers, who contend that they should have a rate advantage over their Eastern competitors commensurate with the difference in distance from the coast. Under the present rates, Chicago has an advantage of 16½c. on rail shipments to the Pacific.

Ferroalloys.—The Scullin Steel Co., St. Louis, is in the market for 50 tons of 50 per cent ferrosilicon, and the Commonwealth Steel Co., St. Louis, wants 50 tons of 12½ per cent Bessemer ferrosilicon. Two sales of 200 tons each of ferromanganese have been made in this district at the ruling price. The Eastern furnace, which has been quoting spiegeleisen at a price equivalent to \$30.50, delivered Chicago, has exhausted its stocks of standard material and is no longer a factor in the market. The lowest present available price is \$36, delivered.

We quote 78 to 82 per cent ferromanganese, \$66.75, delivered; 50 per cent ferrosilicon, \$60, delivered; spiegeleisen, 18 to 22 per cent, \$36 to \$37, delivered.

Pig Iron.—The Mayville furnace, recently blown in, produced its first cast last Saturday and an initial Federal furnace is now warming up. Although it is undeniable that the market is still quiet and buying is cautious, the resumption of merchant furnace operation indicates that aggregate bookings are steadily piling up. The ruling market level rests at \$20 base furnace for foundry, malleable and basic, although 1500 tons of malleable and foundry for first quarter delivery is reported to have been placed for less. A Wisconsin melter and two local jobbing foundries, however, each bought 500 tons of foundry for first quarter at \$20 base, and some carload lots have brought as high as \$20.50 and \$21, furnace. The St. Paul is reported to have bought the 500 tons of malleable for which it issued an inquiry a week ago, and is now in the market for 200 tons of the same grade of iron. The Oliver Chilled Plow Works has closed for 300 tons of foundry for prompt shipment. The Rundle Mfg. Co., Milwaukee, which was in the market for 1700 tons of Southern foundry, secured no furnace quotation below \$17.50 base, Birmingham, but covered part of its requirements with resale mate-

rial bought at less than that figure. Malleable shops appear to be getting more railroad work and are commencing to enter the market for iron.

Quotations on Northern foundry, high phosphorus malleable and basic irons are f.o.b. local furnace and do not include a switching charge averaging 70c. per ton. Other prices are for iron delivered at consumers' yards, or when so indicated, f.o.b., furnace other than local.

Lake Superior charcoal, averaging sil.	
1.50, delivered at Chicago.....	\$31.50
Northern coke, No. 1, sil. 2.25 to 2.75	20.50 to 21.50
Northern coke, foundry, No. 2, sil.	
1.75 to 2.25.....	20.00 to 21.00
Northern high phos.....	20.00 to 21.00
Southern foundry, sil. 1.75 to 2.25....	24.17 to 24.67
Malleable, not over 2.25 sil.....	20.00 to 21.00
Basic.....	21.00
Low phos., Birmingham.....	32.00
Low phos., Valley furnace, sil. 1 to 2	
p-r cent copper free.....	33.00
Slivory, sil. 8 per cent.....	32.02

Railroad Equipment.—The Pere Marquette has ordered 1000 steel underframe box cars from the Western Steel Car & Foundry Co. The Great Northern has issued an inquiry for 1000 composite stock cars in addition to the 500 general service, 500 refrigerator and 1000 box cars previously mentioned in this column. The same road is asking for repairs on 50 passenger cars. The Union Pacific is in the market for 500 double-sheathed wooden box cars, 500 composite 40-ft. automobile cars and 500 all-steel 50-ft. automobile cars. The Northern Pacific has ordered 97 passenger cars from the Pullman Co.

Rails and Track Supplies.—The Burlington has made tentative reservations for about 25,000 tons of rails for 1922 delivery, the exact tonnage not yet having been definitely decided upon. The business will be divided between the Illinois Steel Co. and the Colorado mills.

Standard Bessemer and open-hearth rails, \$40; light rails rolled from new steel, 1.70c. to 1.75c. f.o.b. makers' mills.

Standard railroad spikes, 2.20c. to 2.25c., Pittsburgh; track bolts with square nuts, 3.20c. to 3.25c., Pittsburgh; tie plates, steel and iron, 2c., f.o.b. mill; angle bars, 2.40c., f.o.b. mill.

Bolts and Nuts.—The principal source of current business is the railroads. Although the carriers have issued numerous inquiries, they are slow in placing orders. Prices are not appreciably firmer, concessions being reported whenever an attractive inquiry appears. On large machine bolts as low as 70 and 10 and 5 off, f.o.b. Chicago, has been quoted. For mill prices, see finished iron and steel, f.o.b. Pittsburgh, page 1510.

Jobbers quote structural rivets, 3.43c.; boiler rivets, 3.53c.; machine bolts up to ¾ x 4 in., 60, 10 and 10 per cent off; larger sizes, 60 and 10 off; carriage bolts up to ¾ x 6 in., 60 and 10 off; larger sizes, 55 and 5 off; hot pressed nuts, square and hexagon tapped, \$3.75 off; blank nuts, \$4.00 off; coach or lag screws, gimlet points, square heads, 65 and 5 per cent off. Quantity extras are unchanged.

Structural Material.—The American Bridge Co. submitted the low bid on 3800 tons for a bridge at Yankton, S. D., its tender being approximately \$74 delivered. The same fabricator was the successful bidder on 3600 tons for viaduct work for the Chicago Union Station. Bids will soon be asked on 175 tons for remodeling the McVickers Theater, Chicago. Generally speaking, construction work appears to be on the wane. The plain material price situation is substantially unchanged.

The mill quotation on plain material ranges from 1.65c. to 1.75c., Chicago. Jobbers quote 2.78c. for materials out of warehouse.

Cast-Iron Pipe.—The only new business reported is an inquiry from Galesburg, Ill., for 450 tons of 4- and 6-in., on which bids were taken yesterday. James B. Clow & Sons were the successful bidders on 187 tons for Hamtramck, Mich., and 70 tons for the Detroit Board of Fire Commissioners. Spring Wells, Mich., let 500 tons to the American Cast Iron Pipe Co., and Denver, Col., awarded 78 tons of 36- and 48-in. specials to the United States Cast Iron Pipe & Foundry Co. The latter company and James B. Clow & Sons were the only companies which submitted bids on 900 tons of cast iron pipe for Springfield, Ohio. An alternate steel bid was made by the National Tube Co. The National Cast Iron Pipe Co. is low bidder on 200 tons for Canton, Ohio.

We quote per net ton, f.o.b. Chicago, ex-war tax, as follows: Water pipe, 4-in., \$47.10 to \$48.10; 6-in. and above, \$43.10 to \$44.10; class A and gas pipe, \$4 extra.

Bars.—Except for orders and inquiries from car-builders, there is little current demand for bars. Re-

inforcing projects are less numerous and there is a tendency on the part of contractors to postpone their purchases until next year. Additional contracts for highway work have been let by the Illinois State Highway Commission, but most of the orders for the reinforcing required will not be placed until next spring. The largest reinforcing project in prospect is a sewage disposal plant at Milwaukee requiring 5000 tons. Bids on the general contract will be taken Jan. 13 by the Milwaukee Sewerage Commission, J. H. Fowles, City Hall, secretary. Demand for bar iron is light and while the ruling market is still 1.65c., Chicago, as low as 1.60c. is reported to have been done. Hard steel bar mills continue to operate intermittently. The going price for rail carbon steel bars is 1.65c., Chicago, but concessions below that figure have been made in some instances.

Mill prices are: Mild steel bars, 1.60c. to 1.75c., Chicago; common bar iron, 1.65c., Chicago; rail carbon, 1.65c., mill or Chicago.

Jobbers quote 2.68c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars and shafting is 3.55c. for rounds and 4.05c. for flats, squares and hexagons. Jobbers quote hard and medium deformed steel bars at 2.38c. base. Hoops and bands, 3.28c.

Sheets.—Mills continue to hold firmly to the prices appended below, but buying is not active. Both local makers have opened their books for first quarter at present market quotations.

Mill quotations are 3c. for No. 28 black, 2.25c. for No. 10 blue annealed and 4c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight to Chicago of 38c. per 100 lb.

Jobbers quote: Chicago delivery out of stocks, No. 10 blue annealed, 3.38c.; No. 28 black, 4.15c.; No. 28 galvanized, 5.15c.

Wire Products.—Buying has fallen off appreciably, reflecting the desire of jobbers to keep their inventories down to the minimum at the close of the year. While the jobbing trade is diminishing, orders from the railroads, principally for nails, are gradually increasing. For mill prices, see finished iron and steel, for Pittsburgh, page 1510.

We quote warehouse prices f.o.b. Chicago: No. 9 and heavier black annealed wire, \$3.48 per 100 lb.; No. 9 and heavier bright basic wire, \$3.63 per 100 lb.; common wire nails, \$3.65 per 100 lb.; cement coated nails, \$3.05 per keg.

Old Metal.—Consumers are manifesting little interest in the market and some of them, notably the steel mills, are having difficulty in handling shipments against old orders. Iron mills are buying nothing and demand from foundries is at a minimum. One reason for the present inactivity is the desire to keep stocks down for inventory taking. In the absence of buying, all grades of scrap are weaker and most of them have declined in price. Railroad offerings include the Pere Marquette, 2600 tons; the Union Pacific, 1000 tons; the St. Paul, 700 tons; the Monon, 740 tons; the Pullman Co., 700 tons, and the Erie, a blank list.

We quote delivery in consumers' yards Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton		
Iron rails	.....	\$16.50 to \$17.00
Relaying rails	.....	25.00 to 30.00
Cast iron car wheels	.....	16.00 to 16.50
Rolled or forged steel car wheels	.....	13.50 to 14.00
Steel rails, rerolling	.....	13.00 to 13.50
Steel rails, less than 3 ft.	.....	12.50 to 13.00
Heavy melting steel	.....	11.50 to 12.00
Frogs, switches and guards cut apart	.....	11.50 to 12.00
Shoveling steel	.....	11.00 to 11.50
Low phos. heavy melting steel	.....	14.00 to 14.50
Drop forge flashings	.....	8.00 to 8.50
Hydraulic compressed sheet	.....	8.50 to 9.00
Axle turnings	.....	8.50 to 9.00

Per Net Ton		
Iron angles and splice bars	.....	14.00 to 14.50
Steel angle bars	.....	11.00 to 11.50
Iron arch bars and transoms	.....	15.50 to 16.00
Iron car axles	.....	19.50 to 20.00
Steel car axles	.....	13.50 to 14.00
No. 1 busheling	.....	8.50 to 9.00
No. 2 busheling	.....	6.25 to 6.75
Cut forge	.....	10.50 to 11.00
Pipes and flues	.....	6.50 to 7.00
No. 1 railroad wrought	.....	10.50 to 11.00
No. 2 railroad wrought	.....	10.50 to 11.00
Steel knuckles and couplers	.....	11.50 to 12.00
Coil springs	.....	12.50 to 13.00
No. 1 machinery cast	.....	13.00 to 13.50
No. 1 railroad cast	.....	12.50 to 13.00
Low phos. purchases	.....	11.00 to 11.50
Locomotive tires, smooth	.....	10.00 to 10.50
Machine shop turnings	.....	3.50 to 4.00
Cast borings	.....	5.50 to 6.00
Stove plate	.....	12.50 to 13.00
Grate bars	.....	10.50 to 11.00
Brake shoes	.....	11.00 to 11.50
Railroad malleable	.....	11.50 to 12.00
Agricultural malleable	.....	11.50 to 12.00

Plates.—The Sinclair Crude Oil Purchasing Co.

has placed 50 oil storage tanks of 80,000 barrels capacity each with the Chicago Bridge & Iron Co. Approximately 13,000 tons of steel is involved and all of it has been booked by a local mill. The tanks are to be erected in the New Mexia field in Texas where wells are just coming in and storage facilities are urgently needed because of the present inactive demand for oil. Mills report that specifications for carbuilding steel are slow in coming in, although a considerable tonnage is pending. The bulk of current demand is for tank and car construction. The ruling price on attractive business ranges from 1.60c. to 1.65c., Chicago, while unusual tonnages have been placed at as low as 1.50c. Small lots continue to move at 1.75c. and 1.75c., Chicago.

The ruling mill quotations range from 1.60c. to 1.75c. Chicago. Jobbers quote 2.78c. for plates out of stock.

New York

NEW YORK, Dec. 6.

Pig Iron.—Continued activity in the pig iron market when it was expected that there would be very little buying for the remainder of the month has been a pleasant surprise, and indicates that, particularly among the manufacturers of house furnaces and radiators, there is considerable demand for foundry products, while the purchase by the Pennsylvania Railroad, which had been in the market for 1200 tons; has been made for a somewhat larger tonnage than that, showing that this railroad is requiring an unexpected tonnage of pig iron at Altoona. The largest purchase of the week was made by Richardson & Boynton, Dover, N. J., who bought 5000 tons of foundry grades for first quarter delivery. It is understood that this tonnage was mostly of Pennsylvania irons, but included about 600 tons of Virginia iron and some from Buffalo. Another New Jersey furnace company is about to buy 2500 tons for first quarter, and a number of purchases of 100 and 200 tons have been booked. Pending inquiries include 2000 tons from the Sessions Foundry Co., Bristol, Conn., for the first half, high silicon being specified, a large tonnage for a melter at Westfield, Conn., and 1500 tons for a radiator company for delivery running through February. Prices are being well maintained by eastern Pennsylvania makers, who are not quoting lower than \$20.50, furnace base, and some central Pennsylvania iron has also sold at about that price, but some low quotations have been made by one or two central Pennsylvania furnaces for delivery in New England, and as low as \$18.50 is also reported as having been named by one interest at Buffalo. An inquiry for 7000 tons for export to Japan is being carefully figured on, being treated much more seriously than most of the inquiries recently received from foreign countries. On the whole, pig iron sellers in this district are in a much more cheerful frame of mind than for some time.

We quote delivered in the New York district as follows, having added to furnace prices \$2.52 freight from eastern Pennsylvania, \$5.46 from Buffalo and \$6.16 from Virginia:

East. Pa. No. 1 fdy., sil. 2.75 to 3.25	.....	\$24.52 to \$25.52
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	.....	23.52 to 24.02
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	.....	23.02 to 23.52
Buffalo, sil. 1.75 to 2.25	.....	24.46 to 25.56
No. 2 Virginia, sil. 1.75 to 2.25	.....	29.16

Ferroalloys.—The ferromanganese market is more active. There have been sales of both domestic and British alloy on the basis of \$58.35, seaboard, amounting to about 1000 tons. The leading steel producer is also understood to have sold about 400 tons on a basis of \$60, Pittsburgh. There is more inquiry, one Ohio consumer considering the purchase of 500 tons for first quarter or 1000 tons for the first half, and another consumer asking for bids on about 200 tons. An agent in this market who sells German ferromanganese states that there has been no delay in deliveries of all German alloy sold. Negotiation is \$54, seaboard. The spiegeleisen market is quiet at prevailing quotations, with several carload lots being reported sold. There is no demand for foreign high-grade manganese ore and the market continues nominal. Demand for 50 per cent ferrosilicon

is light, with the market firm at the quotations recently prevailing. Quotations are as follows:

Ferroalloys

Ferromanganese, domestic, delivered, per ton,	\$60.00 to \$63.00
Ferromanganese, British, seaboard, per ton	\$58.35
Spiegeleisen, 20 per cent, furnace, per ton,	\$25.00 to \$26.00
Ferrosilicon, 50 per cent, delivered, per ton..	\$60.00
Ferrotungsten, per lb. of contained metal.	40c. to 50c.
Ferrochromium, 6 to 8 per cent carbon, 60	
to 70 per cent Cr., per lb. Cr., delivered.	10c. to 14c.
Ferrovanadium, per lb. of contained vanadium	\$4.50

Ores

Manganese ore, foreign, per unit, seaboard..	20c.
Tungsten ore, per unit, in 60 per cent concentrates	\$2.00 up
Chrome ore, 40 to 45 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard....	\$20.00 to \$25.00
Chrome ore, 45 to 50 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard.....	\$30.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS ₂ , New York.....	45c. to 50c.

Finished Iron and Steel.—Despite the slump in steel business noticeable this month, the steel companies are detecting numerous signs of expansion early in the new year. There are indications that demand for tin plate and sheets will be exceptionally good and the outlook for structural material also appears favorable. In plates the outward signs of a substantially improved demand are not yet in evidence, though car building and repairing are likely to bring about a better demand for this product. Railroad buying this month has not been large, but 1922 budgets are being worked out and in some instances fairly large sums are being figured on for much-needed improvements to roadbeds and rolling stocks. The Great Northern Railroad has issued an additional inquiry for 1000 stock cars, making a total of 3000 cars in all. The Illinois Central and Burlington business, aggregating 9300 cars, may be placed this week. The Chesapeake & Ohio has asked for prices on 500, "more or less," gondolas and hopper-type cars. In connection with financing recently completed by Argentina for the purchase of locomotives in the United States, it is now learned that provision was also made for the purchase of 1000 gondolas and 1000 box cars. Although all details have not been completed, it is probable that these cars will be partly constructed in this country and assembled at the plant of the Middletown Car Co., a subsidiary of the Standard Steel Car Co., which has a plant in Argentina. Close to 10,000 tons of plates for the Catskill aqueduct has been placed with an Eastern mill by the Merchant Shipbuilding Corporation, Chester, Pa., which will fabricate pipe for one of the contractors, the Frederick Snare Corporation. It is reported that the delivered price on the plates figures back to less than 1.40c., base, Pittsburgh. The American Locomotive Co. has placed about 1000 tons of plates for the 25 locomotives to be built for the Seaboard Air Line. Locomotive companies are also inquiring for about 1600 tons of plates for the 55 locomotives recently inquired for by the Burlington. Structural work is not as active as during November, but a fair volume of business is being placed. Among new inquiries are the following: 500 tons for a hospital in Baltimore; 400 tons for the American Tobacco Co., in Brooklyn; 700 tons for a hotel at Frederick, Md.; 1000 tons for a loft building in Thirty-fifth Street, Manhattan; 1400 tons for a loft building in Thirty-sixth Street, Manhattan; 1200 tons for a Chamber of Commerce building in Newark. Recent orders include a building in Philadelphia taking 6000 tons, awarded to the American Bridge Co.; 800 tons for an apartment house in New York for the Shamokin Realty Co., to Levering & Garrigues Co.; 100 tons for a bridge for the Lehigh & Hudson River Railroad; 600 tons for a hotel at Atlantic City, N. J., to American Bridge Co.; 600 tons for bridges for the Pennsylvania Railroad, to American Bridge Co.; 500 tons for a building for the Warner-Quinlan Asphalt Co., to Hammond Iron Works; 500 tons for an apartment building in Eighty-eighth Street, New York, to George A. Just Co.; 150 tons for a bridge for the Chesapeake & Ohio Railroad. The distribution of rails for the New York Central Lines has not yet been completed, but 125,000 tons has been ordered with options covering 25,000 tons in addition; about 40 per

cent will probably be given to the Lackawanna Steel Co. and also to the United States Steel Corporation, and the remaining 20 per cent to two or three other rail makers, including doubtless the Algoma Steel Corporation.

We quote for mill shipments, New York, as follows: Soft steel bars, 1.80c. to 1.88c.; plates, 1.88c. to 2.03c.; structural shapes, 1.88c. to 2.03c.; bar iron, 1.98c. to 2.03c. On export shipments the freight rate is now 28.5c. per 100 lb., instead of 38c., the domestic rate.

Warehouse Business.—Although November made an auspicious beginning from the standpoint of increased business, the depression of the final two weeks was such as to leave a record with most warehouses as the worst month for business since last July. As a rule, transactions were about 10 per cent less than the business of October. December is expected to be the duller month of the year, but there is belief that after the middle of January buying will resume, as consumers, as a rule, have permitted stocks of material to dwindle to a minimum. Blue annealed sheets have been dropped from 3.53c. per lb. for No. 10 to a base price of 3.28c. per lb. The quotation on black sheets, No. 28 gage, seldom exceeds 4c. per lb., and some warehouses are quoting 4.85c. per lb. instead of 5c. per lb. on No. 28 gage galvanized sheets. Prices on steel wire are stiff and small lots would probably cost the consumer higher than the price that has prevailed for some time. Brass and copper warehouses report about the same conditions during November as the iron and steel warehouses experienced, business having decreased slightly. There is no change in wrought iron and steel pipe. We quote prices on page 1522.

High-Speed Steel.—The market is unchanged. Some sellers are interested in the prospect of some of the large tonnage of high-speed steel discovered by the British Government being exported to this country at extremely low prices. Producers generally quote 18 per cent tungsten at 90c. per lb., although special brands with different analyses are sold at slightly higher prices.

Cast-Iron Pipe.—The two most favorable features are the steady demand for the smaller sizes and the inquiry from oil companies. Next to the stove and radiator industry the cast-iron pipe industry remains the busiest in the iron and steel field. We quote per net ton, f.o.b. New York, carload lots, as follows: 6-in. and larger, \$47.30; 4-in. and 5-in., \$52.30; 3-in., \$62.30, with \$4 additional for Class A and gas pipe.

Coke.—The market is about 25c. lower, guaranteed coke being obtainable at \$4, Connellsville base. The price ranges up to \$4.50. Where consumers are not so particular as to analysis, foundry coke can be obtained at \$3.75. Considerable coke has been sold the past few days.

Old Material.—The market is inactive and the price tendency is lower. Among the items which have declined are railroad heavy melting steel, wrought, pipe and cast scrap. Dullness is expected to continue for some time because of the coming holiday period and inventory taking on the part of the mills.

Buying prices per gross ton, New York, follow:

Heavy melting steel, yard.....	\$7.50 to \$8.00
Steel rails, short lengths, or equivalent	8.50 to 9.00
Rerolling rails	10.00 to 10.50
Relaying rails, nominal.....	30.00 to 35.00
Steel car axles.....	12.00 to 12.50
Iron car axles.....	19.00 to 20.00
No. 1 railroad wrought.....	11.00 to 11.50
Wrought iron track.....	8.50 to 9.00
Forge fire	5.00 to 5.50
No. 1 yard wrought, long.....	9.00 to 9.50
Cast borings (clean).....	6.50 to 7.00
Machine-shop turnings	4.50 to 5.00
Mixed borings and turnings.....	4.50 to 5.00
Iron and steel pipe (1 in. diam. not under 2 ft. long).....	8.00 to 8.50
Stove plate	10.00 to 10.50
Locomotive grate bars.....	10.00 to 10.50
Malleable cast (railroad).....	8.50 to 9.00
Car wheels	11.00 to 11.50

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, follow:

No. 1 machinery cast.....	\$16.50 to \$17.00
No. 1 heavy cast (columns, building materials, etc.), cupola size.....	15.50 to 16.00
No. 1 heavy cast, not cupola size....	14.00 to 14.50
No. 2 cast (radiators, cast boilers, etc.)	10.00 to 10.50

Cincinnati

CINCINNATI, Dec. 6.

Pig Iron.—While the volume of business is light, last week showed a slight improvement over those immediately preceding. The orders are small, a few amounting to 150 and 200 tons, but the general run consisting of carloads. A West Virginia manufacturer bought 150 tons of Northern iron at \$21, Ironton, an Indianapolis melter 200 tons at \$20, Chicago, a Kentucky melter 150 tons of Southern at \$18, Birmingham, and a southern Indiana melter a similar tonnage at the same figure. A Michigan melter closed for 500 tons of foundry, the order going to a Chicago district furnace. Inquiries include one for 500 to 1000 tons of malleable for first quarter from an Indiana melter, and one for 400 tons of foundry from the same district. The National Cash Register Co. is inquiring for 100 tons of foundry for prompt shipment. The Whitaker-Glessner Co. has decided to blow in its Portsmouth furnace and will not purchase iron against its 4000 ton inquiry. This furnace will probably be lighted about Dec. 27, the coke plant commencing operations one week earlier. Prices are inclined to weakness, and it is said that \$19 can be done on tonnages from lake furnaces. Southern Ohio iron is pretty generally quoted at \$20, and Southern iron, on small inquiries is quoted at \$18, base. On a larger tonnage it is said \$17.50, Birmingham, can easily be done, and it is intimated that this figure is now the prevailing one on Southern business.

Based on freight rates of \$4.50 from Birmingham and \$2.52 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base).....	\$22.00 to \$22.50
Southern coke, sil. 2.25 to 2.75 (No. 2 soft).....	22.50 to 23.00
Ohio silvery, 8 per cent sil.....	30.02
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2).....	22.52 to 23.52
Basic, Northern.....	22.02
Malleable.....	23.52

Finished Material.—While as a general thing the market is quiet, there are several bright spots, and as a result expectations of better business following the beginning of the year are more general. Several fair-sized inquiries for reinforcing bars for first quarter shipment are still before the trade, and it is reported that a local construction company has been able to place 300 tons for this delivery, the price reported being 1.50c. A number of plate inquiries from tank construction companies are current, and some business from this source has already been placed. The sheet market is quiet, but tin plate inquiries for first quarter and first half are becoming more numerous. There is very little moving in bars, orders placed being mostly for carload lots. In wire and wire products, there is only fair activity, nail orders being few and far between at the present time, due no doubt to the desire of jobbers to show as low an inventory as possible. Prices show little change, the usual quotation on bars, shapes and plates being 1.60c., though on a desirable order 1.50c. at least can be done. Weakness has again developed in sheets, galvanized being quoted at 3.75c., though the American Sheet & Tin Plate Co. is quoting galvanized at 4c. for immediate and first quarter deliveries. Wire nails are commonly quoted at \$2.75 per keg, base, and plain wire at \$2.50 to \$2.60 per 100 lb. In the structural field, there is more activity. The Middle States Construction Co., Columbus, Ohio, will fabricate 200 tons for a building for the Commercial National Bank, Columbus. Bids are in for an enameling building for the Standard Sanitary Mfg. Co., Louisville, Ky., involving 185 tons; the Roosevelt Office Building, Indianapolis, approximately 800 tons, and the Elks Temple, Cincinnati, about 350 tons. A municipal auditorium and market building at Memphis, Tenn., involving about 800 tons, will be up this week. Several Cincinnati projects involving considerable tonnages of reinforcing bars will shortly go ahead, including the Gibson Hotel addition, the contract for which has been let to the Wells Bros. Construction Co., and a group of seminary buildings, which the Ferro-Concrete Construction Co., Cincinnati, will erect. There will be very little change in plant operations, the American Rolling Mill Co. continuing its same schedule at Middletown, Ohio, and the

Whitaker-Glessner Co. at Portsmouth, adding several mills. The latter company is expected to blow in its blast furnace during the month, and the plant of the Portsmouth By-Product Coke Co. is scheduled for a 50 per cent operation early in January. The Ashland Iron & Mining Co. will continue its present rate of operation, about 50 per cent. The plants of the Andrews Steel Co. and the Newport Rolling Mill Co. at Newport, Ky., will likely resume operations in the near future, as good progress is being made in the adjustment of wage scales with its former employees. The plants will be operated as open shops.

Warehouse Business.—The first week of December showed some improvement over similar periods during the previous month, but the tonnage moving is still light. Prices are unchanged.

Iron and steel bars, 2.90c. base; hoops and bands, 3.50c. base; shapes and plates, 3c. base; reinforcing bars, 2.97½c. base; cold rolled rounds, 1½-in. and larger, 3.70c.; under 1½-in. and flats, squares and hexagons, 4.20c.; No. 10 blue annealed sheets, 3.60c.; No. 28 black sheets, 4.25c.; No. 28 galvanized sheets, 5c.; wire nails, \$3.25 per keg base; No. 9 annealed wire, \$3 per 100 lb.

Coke.—There is nothing specially to report on coke. A sale of 1000 tons for first half is reported at a sliding scale based on wages paid, and another of 200 tons to a Southern railroad was made during the week. With these exceptions the market was rather quiet, with prices unchanged. Many operators in the New River district are either closed down or are contemplating going out.

Old Material.—There is practically no activity in the scrap market. Some steel companies have asked that shipments on old contracts be suspended for the time being. Prices are lower, the average decline being 50c. a ton, the whole list being affected.

We quote dealers buying prices, f.o.b. cars:

	Per Gross Ton
Bundled sheets.....	\$3.50 to \$4.00
Iron rails.....	12.00 to 12.50
Relaying rails, 50 lb. and up.....	25.00 to 26.00
Re-rolling steel rails.....	10.50 to 11.00
Heavy melting steel.....	9.00 to 9.50
Steel rails for melting.....	9.00 to 9.50
Car wheels.....	12.00 to 13.00

	Per Net Ton
No. 1 railroad wrought.....	8.50 to 9.50
Cast borings.....	3.00 to 3.50
Steel turnings.....	2.00 to 2.50
Railroad cast.....	12.00 to 12.50
No. 1 machinery.....	13.50 to 14.50
Burnt scrap.....	7.50 to 8.00
Iron axles.....	15.50 to 16.50
Locomotive tires (smooth inside).....	9.50 to 10.00
Pipes and flues.....	4.00 to 4.50

Buffalo

BUFFALO, Dec. 6.

Pig Iron.—About 5000 tons has been sold by four of the five factors; the one exception not having sold any iron in 30 days. Considerably larger inquiry has appeared, but as most of it is from outside the district there is little optimism that it will develop into sales. The American Radiator Co. wants are 4000 tons. One interest which has 14,000 tons inquired for has made sales of 3500 tons. Sales of malleable and basic iron as well as foundry have been taken. Some first quarter business has been booked. On the current inquiry put out by radiator interests, 1300 tons has been booked at \$19, base.

We quote f.o.b. dealers' asking prices per gross ton Buffalo as follows:

No. 1 foundry, 2.75 to 3.25 sil.....	\$20.00
No. 2X foundry, 2.25 to 2.75 sil.....	19.50
No. 2 plain, 1.75 to 2.25 sil.....	19.00
Basic.....	21.00
Malleable.....	21.00
Lake Superior charcoal.....	31.75

Finished Iron and Steel.—A wire maker now operating 75 per cent with bookings sufficient to carry on the same schedule until well into 1922 represents the high tide in this district. Other activities are perhaps no better off than in June or July, when the dull period was at its worst stage. The ruling price on bars is 1.50c. Pittsburgh, but the ruling price is known to have been disregarded on sales which have not been extraordinary in volume. A price of 1.40c. on bars, upon investigation, is said to have developed the information that the order was filled with re-rolled material. A

desire to keep inventories down for tax purposes is given as one cause of a buyers' embargo, and the fact that what little material is ordered is wanted for immediate delivery, lends strength to this belief. Canadian business is especially quiet. Some plate demand for car work both old and new continues to appear. The Lackawanna Bridge Co. will fabricate 100 tons of shapes for a Lockport theater. Bar orders coming to one mill are mostly carload with an occasional call for 100 tons; with an accumulation of these rolling is carried on intermittently.

Warehouse Business.—Although prices are admittedly satisfactory to buyers, the general run of orders is quiet. Nails are especially weak, and with the exception of a slight flurry in structural shapes for rush delivery in cleaning up some operations before weather intervenes, little is occurring from day to day.

We quote warehouse prices f.o.b. Buffalo as follows: Structural shapes, 2.80c.; plates, 2.80c.; plates, No. 8 gage, 3.50c.; soft steel bars and shapes, 2.70c.; hoops and bands, 3.30c.; blue annealed sheets, No. 10, 3.55c.; galvanized steel sheets, No. 28, 5.25c.; black sheets, No. 28, 4.25c.; cold-rolled strip steel, 5.90c.; cold-rolled round shafting, 3.80c.

Old Material.—Two mills are buying small lots of steel—practically the only worth-while activity in the market. No price changes have occurred nor is any expected until after the close of the year. No tangible reason is apparent for expecting any improvement in the new year, but the majority of dealers prefer to take such a view.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel.....	\$13.00 to \$14.00
Low phos., 0.04 and under.....	17.00 to 18.00
No. 1 railroad wrought.....	15.00 to 16.00
Car wheels.....	16.50 to 17.50
Machine shop turnings.....	7.50 to 8.00
Cast iron borings.....	7.00 to 8.00
Heavy axle turnings.....	10.50 to 11.50
Grate bars.....	12.00 to 13.00
No. 1 busheling.....	10.00 to 11.00
Stove plate.....	15.00 to 16.00
Bundled sheet stampings.....	8.00 to 9.00
No. 1 machinery cast.....	17.00 to 18.00
Hydraulic compressed.....	10.50 to 11.50
Railroad malleable.....	13.00 to 14.00

Cleveland

CLEVELAND, Dec. 5.

Iron Ore.—With the close of the ore shipping season, ore firms are giving a little more attention to next year's prospects. The ore buying movement in 1922, like the present season, is expected to start very late. The shipping season closed with less ore on the docks and in furnace yards Dec. 1 than on the same date a year ago. While pig iron production at this time last year was approximately double the present production, it fell off rapidly during the winter months as compared with an upward trend at present. Consequently, ore men predict there will be slightly less ore on the docks and at furnace yards at the opening of navigation next year than there was at the same time this year. The amount of ore on docks and in furnace yards Nov. 1 was 39,070,000 tons as compared with 39,600,000 tons on the same date a year ago. On Dec. 1 last year, there was over 41,000,000 tons of ore on docks and in furnace yards and with the very light ore movement in November, it is expected that figures will show a reduction of 3,500,000 to 4,000,000 tons on docks and in furnace yards Dec. 1 from the amount on hand Dec. 1 last year. M. A. Hanna & Co. resumed operations Dec. 1 at their Carpenter and Monongahela mines at Crystal Falls on the Menominee range.

We quote delivered lower lake ports: O'd range Bessemer, 55 per cent iron, \$6.45; Old range non-Bessemer, 51½ per cent iron, \$5.70; Mesabi Bessemer, 55 per cent iron, \$6.20; Mesabi non-Bessemer, 51½ per cent iron, \$5.55.

Pig Iron.—The American Radiator Co. during the week purchased 7600 tons of foundry iron for early shipment, including 4500 tons for Buffalo, 2500 tons for Detroit and 300 tons each for its Springfield and Titusville plants. The market improved somewhat both in orders and inquiries during the week, but the price situation shows a weakening tendency, as the \$20 price for foundry iron which has been generally quoted as a minimum by lake and Valley furnaces is no longer being firmly held. A lake furnace has sold 1000 tons of foundry iron to an Ohio sanitary interest for Jan-

uary and February delivery on the basis of \$20 Valley furnace. This iron will go to two plants, one with the same freight rate from Cleveland as from the Valley, and the other has a 40c. differential against Cleveland, making the price \$19.60 at furnace. On a 500-ton inquiry the prospective buyer claims to have been quoted \$19.50. Several inquiries in lots up to 1000 tons for the first half have come out, but in each case the consumer decided to buy in smaller lots for only two months' requirements. Some producers will quote current prices for the first half delivery. One lake furnace sold 1500 tons during the week in small lots at \$20, including 250 tons of malleable iron purchased by an Indiana melter. The Whitaker-Glessner Co., which inquired for 4000 tons of basic iron for its Portsmouth, Ohio, plant, has decided to blow in its Portsmouth furnace earlier than it had intended, and will not buy basic iron. A Connecticut consumer is inquiring for 2000 tons of foundry iron for the first half. December shipments are starting out light and stocks in furnace yards are increasing.

Quotations below are f.o.b. local furnace for Northern foundry iron, not including a 56c. switching charge. Other quotations are delivered Cleveland, being based on a \$1.95 freight rate from Valley points, a \$3.36 rate from Jackson and a \$6.67 rate from Birmingham:

Basic.....	\$20.96
Northern No. 2 fdy., sil. 1.75 to 2.25.....	\$20.00 to 21.00
Southern fdy., sil. 2.25 to 2.75.....	25.17
Ohio silvery, sil. 8 per cent.....	32.86
Standard low phos., Valley furnace.....	34.00 to 35.00

Finished Iron and Steel.—The demand for finished steel has fallen off, although some of the mills continue to get small orders. It seems to be the general attitude of buyers to have their stocks as low as possible at inventory time and they are buying only such material as they actually need and are deferring purchases until the last minute and then insisting on quick shipment. However, a little inquiry has come out for steel for January delivery. With the tapering off in the tonnage, some mills expect to find it difficult to keep up their present schedule of operations until January, when better buying is looked for. Prices on steel bars, plates and structural material have more generally settled down to 1.50c., but some of the smaller plate mills are still holding to 1.60c. and 1.65c. However, mills generally show no inclination to go below 1.50c. and some buyers have made unsuccessful efforts to place attractive tonnages at lower prices. Interest during the week centered on 3000 tons of soft steel reinforcing bars for the Baldwin Reservoir, for which the contractor, the Strange & Walsh Construction Co., has taken bids, specifying deliveries of 1000 tons for each of the first three quarters of next year. While this order will test the market, it seems probable, because of the extended deliveries, mills may not be inclined to go as low as they otherwise would. The only sizeable tonnage placed during the week was 800 tons of plates purchased by a lake shipyard for repair work. Some other round lot plate orders are still pending for oil country work. There is virtually no activity in structural material. Hoops and bands continue weak. Some hot strip mills are competing with hoop mills with a 1.75c. price for heavier sections, figuring these products on a bar basis. Hard steel reinforcing bars are in very light demand with 1.50c. as a common minimum quotation, but the market is weak and a good lot inquiry might bring out a lower price. In tin plate, a fair volume of business is being placed in first quarter and first half contracts.

Jobbers quote steel bars, 2.54c.; plates and structural shapes, 2.64c.; No. 9 galvanized wire, 3.50c.; No. 9 annealed wire, 3.25c.; No. 28 black sheets, 3.75c.; No. 28 galvanized sheets, 4.75c.; No. 10 blue annealed sheets, 3.10c.; hoops and bands, 3.14c.; cold-rolled rounds, 3.85c.; flats, squares and hexagons, 4.35c.

Sheets.—The sheet market is very dull. Consumers generally have covered for the remainder of the year at prices \$5 a ton lower than present quotations and there is little buying for January shipment. The mills seem to be holding to the regular quotations of 3c. for black, 4c. for galvanized and 2.25c. for blue annealed sheets.

Warehouse Business.—Warehouse orders have fallen off this month and sales are extremely light. Prices are unchanged.

Bolts, Nuts and Rivets.—New demand for bolts and nuts continues very light. Consumers are buying very small lots, as they wish to keep their stocks low at inventory time. The demand for rivets is slow and prices are irregular. Regular quotations of 2.40c. for structural rivets and 2.50c. for boiler rivets are being shaded from \$2 to \$3 a ton.

Old Material.—The market shows a little more life as a result of some new demand that has come from consumers and prices on grades that have become active have stiffened. The National Tube Co. is credited with the purchase of approximately 5,000 tons of heavy melting steel for its Lorain plant at about \$14.50 delivered, and odd lots are being purchased from dealers to fill the Lorain order. According to local dealers, the National Tube Co. has never previously purchased scrap for its Lorain plant. A Cleveland mill is reported to have purchased a small lot of heavy melting steel at \$13 and some tonnage of the same grade has been placed by another Ohio mill. Some demand has been created for borings and turnings for a Cleveland consumer who has arranged with a dealer to take blast furnace scrap instead of heavy melting steel scrap covered by an old contract. Sales between dealers are reported at \$8 for machine shop turnings and \$9 for mixed borings and short turnings for delivery to this mill.

We quote per gross ton, f.o.b. Cleveland, as follows:

Heavy melting steel.....	\$11.50 to \$12.00
Steel rails, under 3 ft.....	12.50 to 13.00
Steel rails, rerolling.....	14.00 to 14.50
Iron rails.....	12.00 to 12.50
Iron car axles.....	18.00 to 19.00
Low phosphorus melting.....	13.00 to 13.50
Cast borings.....	8.50 to 8.60
Machine shop turnings.....	7.50 to 7.60
Mixed borings and short turnings.....	8.50 to 8.60
Compressed steel.....	9.00 to 9.25
Railroad wrought.....	12.00 to 12.50
Railroad malleable.....	12.50 to 13.00
Light bundled sheet stampings.....	6.00 to 7.00
Steel axle turnings.....	9.00 to 10.00
No. 1 cast.....	15.00 to 16.00
No. 1 busheling.....	8.25 to 8.75
Drop forge flashings, over 10 in.....	7.50 to 8.00
Drop forge flashings, under 10 in.....	7.50 to 8.00
Railroad grate bars.....	12.75 to 13.00
Stove plate.....	13.00 to 13.25
Pipes and flues.....	8.50 to 9.00

St. Louis

ST. LOUIS, Dec. 5.

Pig Iron.—The demand for pig iron is rather light. The approach of inventory time, the anticipation of lower freight rates and the lack of orders are all having their effect on the trade. The inquiry of the Mount Vernon Car Wheel Co., Mt. Vernon, Ill., was for from 500 to 1000 tons of malleable, and it placed an order, the exact amount of which is not stated. A local melter bought 1500 tons of malleable and 500 tons of foundry iron from a local producer for immediate and nearby delivery. A Wisconsin melter is in the market for 800 tons of foundry iron for delivery during all of next year, which is regarded as an expression of confidence in the present market price. A radiator company in this territory is in the market for from 500 to 1000 tons of foundry iron, silicon 2.25 to 2.75, for December shipment. A local producer has received an inquiry from Porto Rico. An Indiana melter wants 1000 tons of malleable for the early part of next year. While no formal announcement has been made, it is understood that the furnaces of the St. Louis Coke & Chemical Co., Granite City, will be started up soon. The market is at \$20 and \$21, Chicago, for Northern iron, and while Southern iron is quoted at \$18, some offers are being made at \$17.50, Birmingham.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices \$2.88 freight and war tax from Chicago and \$5.91 from Birmingham:

Northern foundry, sil. 1.75 to 2.25.....	\$22.88 to \$23.88
Northern malleable, sil. 1.75 to 2.25.....	22.88 to 23.88
Basic.....	22.88 to 23.88
Southern foundry, sil. 1.75 to 2.25.....	23.41 to 23.91

Finished Iron and Steel.—There is very, very little activity in structural steel locally, all building operations being at a standstill pending the result of a referendum among the 14,000 members of the Building Trades Council for a reduction in wages from \$1.25 to \$1 an hour. An Oklahoma City contractor obtained the

contract for the Masonic Temple there, involving 1500 tons of structural shapes. The general contract for the Roosevelt Building, Indianapolis, involving 250 tons of structural steel has been let to Hetherington & Berner, that city. An inquiry has been received here from the Union Pacific Railroad 500 50-ton all steel box cars, and 500 40-ft. automobile cars, with 500 50-ft. automobile cars in prospect. Inquiries from railroads centering here are rather light, the largest being from the Missouri, Kansas & Texas Railroad for 75 tons of plates. Inquiries were being made by a railroad supply house for 2500 kegs of track spikes and 1500 kegs of track bolts.

For stock out of warehouse we quote: Soft steel bars, 2.87½c. per lb.; iron bars, 2.87½c.; structural shapes, 2.97½c.; tank plates, 2.97½c.; No. 10 blue annealed sheets, 3.47½c.; No. 28 black sheets, cold rolled, one pass, 4.10c.; cold drawn rounds, shafting and screw stock, 4.20c.; structural rivets, \$3.77½ per 100 lb.; boiler rivets, \$3.87½; tank rivets 7/16 in. and smaller, 60-10 per cent off list; machine bolts, large, 55 per cent; small, 60 per cent; carriage bolts, large, 50-5 per cent; small, 55 per cent; lag screws, 60 per cent; hot pressed nuts, square or hexagon blank, \$3.25; and tapped, \$3.00 off list.

Coke.—The market for coke is very quiet, the only inquiry of note being from a Western gas manufacturer for 5000 tons. Users of foundry coke are not interested in purchasing, because of a lack of orders for castings, the approach of inventory time and the belief that freight rates will be lower. The mild weather until the latter part of last week has affected the sale of domestic coke. An inquiry was received by a local producer from Porto Rico.

Old Material.—The market for old material is dull and listless, and while there has been no marked decline in prices, the tendency is toward lower levels. Buyers are not interested, and will not make any further purchases this year, unless it be an occasional bargain. Inquiries for relaying rails are almost nil, and prices are softer. The railroad offers before the market this week follow: Baltimore & Ohio, 11,000 tons; Wabash, 1500 tons; Pennsylvania System, Northwestern Region, 2700 tons; Southwestern Region, 4500 tons; Eastern Region, 20,000 tons, which includes 8000 tons of No. 1 steel rails and 2000 tons of miscellaneous scrap rails.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton

Old iron rails.....	\$15.50 to \$16.00
Steel rails, rerolling.....	12.50 to 13.00
Steel rails, less than 3 ft.....	13.00 to 13.50
Relaying rails, standard section.....	25.00 to 30.00
Cast iron car wheels.....	15.00 to 15.50
No. 1 heavy railroad melting steel.....	11.00 to 11.50
No. 1 heavy shoveling steel.....	10.50 to 11.00
Ordinary shoveling steel.....	10.00 to 10.50
Frogs, switches and guards cut apart.....	11.00 to 11.50
Ordinary bundle sheet.....	4.00 to 4.50

Per Net Ton

Heavy axles and tire turnings.....	6.50 to 7.00
Iron angle bars.....	13.00 to 13.50
Steel angle bars.....	10.00 to 10.50
Iron car axles.....	20.00 to 21.00
Steel car axles.....	14.00 to 14.50
Wrought iron arch bars and transoms.....	15.00 to 15.50
No. 1 railroad wrought.....	10.50 to 11.00
No. 2 railroad wrought.....	9.50 to 10.00
Railroad springs.....	11.50 to 12.00
Steel couplers and knuckles.....	11.50 to 12.00
Locomotive tires, 42 lb. and over, smooth inside.....	9.50 to 10.00
No. 1 dealers' forge.....	9.00 to 9.50
Cast iron borings.....	6.50 to 7.00
No. 1 busheling.....	10.00 to 10.50
No. 1 boilers cut in sheets and rings.....	8.00 to 8.50
No. 1 railroad cast.....	14.50 to 15.00
Stove plate and light cast.....	12.50 to 13.00
Railroad malleable.....	10.00 to 10.50
Agricultural malleable.....	9.50 to 10.00
Pipes and flues.....	7.50 to 8.00
Heavy railroad sheet and tank.....	6.50 to 7.00
Light railroad sheet.....	4.50 to 5.00
Railroad grate bars.....	10.00 to 10.50
Machine shop turnings.....	6.00 to 6.50
Country mixed iron.....	7.50 to 8.00
Uncut railroad mixed.....	8.50 to 9.00
Horseshoes.....	11.00 to 11.50
Railroad brake shoes.....	9.50 to 10.00

"He didn't know whether the drill was through or not—he found out when it tore off his finger." This is the caption of a photograph appearing on a recent poster of the National Safety Council. The photograph represents a machinist feeling under a plate being drilled."

Boston

BOSTON, Dec. 6.

Pig Iron.—Competition between central Pennsylvania and Buffalo furnaces, with practically the same freight rate for business in this territory, was keen this week, and the market broke below \$19, Buffalo furnace base. Little regard is paid silicon differentials and extra discounts for cash are offered. Among sales are 200 tons Pennsylvania, silicon 4.00 to 5.00 at \$20 furnace; 250 tons, silicon 2.25 to 2.75 at \$19; 200 tons at practically the same price; a round tonnage of Buffalo silicon 2.25 to 2.75 at less than \$19, and silicon 2.75 to 3.25 at less than \$19.50. Buffalo iron with silicon above 3.25 is offered at less than \$19.50. Smaller lots include 150 tons malleable and a car of special analysis at approximately \$19 furnace; a car of Buffalo No. IX at \$19.50, and two cars of lake charcoal iron at \$28. A sale of 500 tons of Northern No. 2X for Vermont delivery, at private terms, is reported. An unconfirmed sale of 2000 tons central Pennsylvania No. 2 plain at between \$23.50 and \$23.75 delivered western Massachusetts is reported. Eastern Pennsylvania iron at \$20 furnace base is offered more freely. There are furnaces in this district holding at \$20.50 and \$21, but getting practically no business in New England. The Bethlehem Steel Co. has opened its first quarter books. Alabama iron is now offered on this market at \$18 furnace base, but freight rates restrict sales. The recent reduction from \$6.50 all rail to \$6.08 rail and water Merchant & Miners Transportation Co. rate from furnace to Boston and Providence, has failed to stimulate buying of Virginia irons. French iron, silicon 2.25, high in phosphorus, is offered at \$19.75 per gross ton, c.i.f. dock Boston, but no sales are reported.

We quote delivered at common New England points as follows, having added to furnace prices \$4.06 freight from eastern Pennsylvania, \$5.46 from Buffalo, \$6.58 from Virginia and \$10.66 from Alabama:

East. Penn., silicon 2.25 to 2.75.....	\$24.56 to \$25.56
East. Penn., silicon 1.75 to 2.25.....	23.06 to 25.06
Buffalo, silicon 2.25 to 2.75.....	23.93 to 25.68
Buffalo, silicon 1.75 to 2.25.....	23.93 to 25.18
Virginia, silicon 2.25 to 2.75.....	30.08 to 31.08
Virginia, silicon 1.75 to 2.25.....	29.58 to 30.58
Alabama, silicon 2.25 to 2.75.....	29.16
Alabama, silicon 1.75 to 2.25.....	28.66

Warehouse Business.—Local quotations on cut washers have been reduced \$1.50 per keg, and on cast washers 1½c. per lb. Malleable washers are unchanged. Cone head, boiler quality and button head structural rivets are down 25c. per keg, and cut nails as much; the latter at \$4.25 per keg base. Bolt and nut quotations have been revised, both advances and declines showing, while coach screws have been cut 10 per cent, and set screws 5 per cent. The market on standard makes of anvils is 4c. lower at 16c. per lb. There has been a further adjustment in local quotations on black wire cloth, f.o.b. Pittsburgh, on factory shipments through jobbers, to conform with mill lists issued some time back. The movement of bars out of warehouse just about holds its own. The demand for sheets and tin plate is relatively better than that for structural steel, although most warehouses are doing a very good structural steel business.

Jobbers now quote: Soft steel bars, \$2.71½ per 100 lb. base; flats, \$3.21½; concrete bars, \$2.20 to \$2.71½; tire steel, \$4 to \$4.40; spring steel, open hearth, \$4.50; crucible, \$11.50; steel bands, \$3.31½ to \$3.78; steel hoops, \$3.31½; toe calk steel, \$5; cold rolled steel, \$3.75 to \$4.25; structural steel, \$2.71½; plates, \$2.81½ to \$2.99; No. 10 blue annealed sheets, \$3.73; No. 28 black sheets, \$4.50; No. 28 galvanized sheets, \$5.50; refined iron, \$2.71½; best refined, \$4.25; Wayne iron, \$5.50; Norway iron, \$5.50 base.

Finished Material.—Bids were opened this week by the Boston & Maine Railroad on 2300 tons structural steel for the Newburyport bridge, but no award was made. Bids on the Neponset bridge project, involving 1270 tons structural steel, for the second time were rejected because of insufficient appropriation. The structural steel market is quiet and indications are it will remain so until early next year. On small tonnages 1.60c., Pittsburgh, is the general price, but 1.50c. could be done on large lots. The Portland Co., Portland, Me., has purchased between 300 and 400 tons wide plates, fire box steel. Other buying has been in small tonnages, generally at 1.50c., Pittsburgh, or 1.55c. The demand for bars has dropped to small proportions, while that for sheets is slightly better. Operations at the

Wickwire Spencer Steel Corporation, Palmer, Mass., wire products mill were greatly curtailed for three days, due to the failure of electric power. The recent ice storm practically put the power company out of business during that time.

Coke.—The New England Coal & Coke Co., Boston, and the Providence Gas Co., Providence, R. I., made no change in their quotation on by-product foundry coke this month, both quoting on a \$10.66 delivered base where the local freight does not exceed \$3.40. Average daily shipment from ovens is slightly in excess of that for the corresponding period last month. Most New England foundries are slowly increasing their melts and have comparatively small fuel supplies, which accounts for an increase in contracting for first half coke at price ruling date of shipment. The market for both contract and spot fuel lacks snap, however.

Old Material.—The market has been practically at a standstill since last reports. The average New England foundry apparently has enough stock on hand to carry it over the year-end. Brokers have made unsuccessful efforts to move stove plate at \$15 delivered, No. 1 machinery cast at the same price, and No. 2 cast at \$13 to \$13.50. A demand for cast iron borings still exists and prices hold firm, but the market on turnings is all of 50c. lower on the withdrawal of buyers. Railroad wrought and wrought pipe also are easier because owners are more willing to sell than they have been and buyers naturally are holding back. The market at the moment appears nominal at \$8 for heavy melting steel, but large tonnages possibly could be obtained for slightly less.

The following are for gross ton lots delivered consuming points:

No. 1 machinery cast.....	\$18.00 to \$19.00
No. 2 machinery cast.....	16.00 to 17.00
Stove plate.....	15.50 to 16.00
Railroad malleable.....	13.50 to 14.00

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel.....	\$8.00 to \$8.25
No. 1 railroad wrought.....	12.00 to 12.50
No. 1 yard wrought.....	9.50 to 10.50
Wrought pipe (1-in. in diameter, over 2 ft. long).....	7.50 to 8.00
Machine shop turnings.....	3.50 to 4.00
Cast iron borings, rolling mill.....	5.50 to 6.25
Cast iron borings, chemical.....	6.50 to 6.75
Blast furnace borings and turnings.....	3.50 to 4.00
Forged scrap and bundled skeleton.....	4.50 to 5.00
Steel car axles and shafting.....	11.50 to 12.00
Car wheels.....	11.00 to 12.00
Rerolling rails.....	10.50 to 11.00

Birmingham

BIRMINGHAM, ALA., Dec. 6.

Pig Iron.—The Birmingham iron market entered December on an \$18 base, the usual quotation, but shading of this base by more than one interest when needed to secure business is not denied. Some iron has sold at \$17.50 when sacrifice of differentials is considered, or where broker's fees entered. As a whole, the market remained at \$18 toward the end of the week with very little business. One maker did not enter an order during the week. Another booked 600 tons, the largest order being for 100 tons. One lot of 500 tons of No. 3 for delivery in an adjoining State was booked at \$17.50 just before the latest market weakening. One active furnace interest booked its one-stack make in November, but others do not claim to have booked more than half to 75 per cent of make. One active concern has added 4,000 tons to stocks. Others have either reduced yard holdings or at least not added to them. Pipe prospect is so good that reasonable consumption in that quarter seems assured for some time. It remains that lower prices failed to bring business. Never was the volume less. Even pipe company purchases are made in dribbles. St. Louis iron interests are asking the Southern freight rate committee to establish the same commodity rates on iron to Birmingham and other Southern points from St. Louis as apply to St. Louis from Birmingham. There are no Southbound iron commodity rates at present.

We quote per gross ton f.o.b. Birmingham district furnaces, as follows:

Foundry, silicon 1.75 to 2.25.....	\$17.50 to \$18.00
Basic.....	17.00
Charcoal, warm blast.....	35.00

Finishing Mills.—The Tennessee company resumed this week at the Fairfield structural mill on an accumulation of orders, other mills operating on the same schedule as for weeks past. The week's schedule approaches 60 per cent. The car plant of the Chickasaw Shipbuilding and Car Co. has received an order for heavy repairs on several hundred Central of Georgia Railroad cars and is building 15 standard steel cars per day for the Louisville & Nashville. The Ingalls Iron Co. has booked two steel bridges in Mississippi and seven in Georgia besides the Agricola Pipe Co. shop in Gadsden and National Forge Co. shop in Anniston. It is completing a steel building for the Knoxville Fertilizer Co. and a building for the Fulton Bag Co. at New Orleans. Structural steel operations are at 60 per cent. Galvanized steel for roofing and steel pipe for plumbers' use are fairly active. The Gulf States Steel Co. made a record of 7,515 tons of rods in November.

Cast Iron Pipe.—The Pacific Coast is taking considerable high pressure pipe, from 5,000 to 6,000 tons leaving the port of Mobile this month for distribution via Los Angeles. Demand for sanitary pipe is also regular, shipments being to practically all the Pacific Coast ports. Freight via canal is \$14.13 vs. \$31.70 all-rail. General pipe business is not coming in, but plants have enough for operation for remainder of year and outlook is good. High pressure base is \$34 and sanitary base \$40.

Coal and Coke.—The Monterey, Mexico, district is taking 2500 tons of by-product coke per month on a continuing basis. Pacific Coast business is inhibited for time being by high freight rates and cheaper foreign cokes. Operations have not been reduced. The scale is \$5.50 to \$6 for beehive and by-product and \$8 for Barrett Co. pitch coke.

Old Material.—No scrap is being bought pending the shop inventory period. Stocks on consumers' yards are sufficient for the remainder of the year and they are not adding to supply. Cast scrap is weaker by \$1 following slump in pig iron.

We quote per gross ton f.o.b. Birmingham district yards as follows:

Steel rails	\$11.00 to \$12.00
No. 1 steel	10.00 to 11.00
No. 1 cast	14.00 to 15.00
Car wheels	12.00 to 14.00
Tramcar wheels	12.00 to 13.00
No. 1 wrought	12.00 to 13.00
Stove plate	11.00 to 12.00
Cast iron borings	6.00 to 7.00
Machine shop turnings	6.00 to 7.00

Philadelphia

PHILADELPHIA, Dec. 6.

Aside from a fairly substantial improvement in the demand for pig iron, the local market continues to reflect the year-end dullness that has been noted in the past two or three weeks. Buying of iron in the past week totaled 20,000 tons, divided about equally between steelmaking and foundry grades, and inquiries aggregating fully 15,000 tons are pending. Much of the interest in foundry iron is from consumers who have not hitherto covered their requirements for first quarter.

A 10,000-ton order for plates from a shipbuilding company which will fabricate water pipe for a contractor who is to build a portion of a new line from the Catskill aqueduct to New York is the only conspicuous item in the steel trade. This business has gone to an Eastern mill, and though the details are somewhat obscured at present, it is reliably reported that the business was taken at about 1.80c. to 1.90c., delivered, Chester, Pa., which includes a 15c. per 100 lb. extra for flanging. This works back to a base price of about 1.30c. to 1.40c., Pittsburgh, but the mill taking the tonnage will net upward of 1.50c., mill.

Pig Iron.—Though the latter part of November brought with it marked dullness in the Eastern pig iron trade, the expectation of sellers that buying for first quarter delivery would start early in December seems to have been verified by events of the past week. Fully 10,000 tons of foundry iron for shipment in the first three months of 1922, and in some instances shipments commencing this month, have been sold locally in the

past week and at least 15,000 tons of iron inquiry is pending, much of which comes from the New England and New York districts. One New England melter will probably close this week on 7500 tons and there are other sizable inquiries and a considerable number which average from 100 to 200 tons. A furnace company in New Jersey closed a few days ago for 5000 tons of foundry grades, including about 600 tons of Virginia iron, paying for the latter about \$28, delivered. The eastern Pennsylvania iron purchased was at \$21, furnace, for No. 2 plain and probably \$1 higher for No. 2X. Most of the iron sold for first quarter has ranged from \$20.50 to \$21, furnace, for No. 2 plain and from \$21.50 to \$22, furnace, for No. 2X. Sales of the week include 9000 tons of basic iron, of which 7000 tons will go to a Harrisburg steel company and 2000 tons to a Delaware steel company. Most of the business was taken at \$20, furnace, but on one sale the price was slightly under this figure. In one instance a high freight rate was paid by the buyer to obtain iron which he particularly desired. The Pennsylvania Railroad, which inquired for 2500 tons of foundry iron, has placed its order with a central Pennsylvania furnace company. Prices on foundry iron are fairly steady for this district, but eastern Pennsylvania furnaces have shown an inclination to shade quotations on New England and New York State business in competition with Buffalo furnaces quoting \$19, furnace, on No. 2 plain. There is little or no activity in low phosphorus, malleable and gray forge grades.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia, and include freight rates varying from 84 cents to \$1.54 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	\$21.34 to \$22.04
East. Pa. No. 2X, 2.25 to 2.75 sil.	22.34 to 23.04
Virginia No. 2 plain, 1.75 to 2.25 sil.	27.74 to 28.74
Virginia No. 2X, 2.25 to 2.75 sil.	28.24 to 29.74
Basic deliv. eastern Pa.	21.00 to 21.50
Gray forge	22.50 to 23.00
Malleable	24.00 to 25.00
Standard low phos. (f.o.b. furnace)	36.50
Copper bearing low phos. (f.o.b. furnace)	35.00

Coke.—The market is weak and some distress coke continues to appear. Offers of coke of this kind have been made as low as \$2.60, Connellsville. Foundry coke, prompt, is available at \$4 and upward. No contracts for furnace coke for first quarter are reported, but furnaces are negotiating and hope to buy at a figure close to \$3. The coke operators are asking figures up to \$3.40, Connellsville.

Ferroalloys.—No change has occurred in the ferromanganese situation. Both American and British sellers are adhering firmly to \$58.35, seaboard, for the standard grade, but there is very little buying. Spiegeleisen continues nominal at \$25 to \$27, furnace.

Billets.—Quotations on open-hearth rerolling billets range from \$28 to \$30, Pittsburgh, and on forging billets, \$33 to \$35, Pittsburgh. There is very little demand.

Plates.—The market is extremely dull, so dull, in fact, that an Eastern steel company which desired to operate its plate mill during the two weeks prior to Christmas to give its men holiday funds was unable to stir up any interest among consumers, and may fail in its objective. There is considerable interest in the 10,000-ton order of the Merchant Shipbuilding Co., Chester, Pa., which will fabricate some of the pipe for the Catskill aqueduct work in New York. The business is reported to have been placed with an Eastern mill at a price approximating 1.80c. to 1.90c., Chester, this including an extra of 15c. per 100 lb. for flanging. Deducting the extra and the Pittsburgh freight rate, this price works back to about 1.30c. to 1.40c., Pittsburgh, but will net the company taking the order slightly above 1.50c., mill. Ordinary lots of plates are quoted at 1.50c., Pittsburgh, but this price is usually shaded when attractive orders are in prospect.

Structural Material.—Very little building work is in prospect in Philadelphia and nearby cities. The city of Philadelphia is in the market for a few bridges, for which a few hundred tons of steel will be required. Plain material is usually quoted at 1.50c., Pittsburgh, on ordinary lots.

Bars.—Soft steel bars are quoted at 1.50c., Pittsburgh, and bar iron at 1.60c., Pittsburgh. Demand is very light.

Sheets.—Prices have been somewhat stabilized by the recent announcement of first quarter prices by the American Sheet & Tin Plate Co. These prices, 2.25c. on blue annealed, 3c. on black and 4c. on galvanized, Pittsburgh, are now quoted by all producers.

Old Material.—Consumers are taking in very little old material this month, and prices have sagged. A number of items have been revised downward about 50c. per ton. We quote for delivery to consumers in the Philadelphia district as follows:

No. 1 heavy melting steel.....	\$11.50 to \$12.50
Scrap rail	11.50 to 12.50
Steel rails, rerolling.....	16.50 to 17.00
No. 1 low phos., heavy 0.04 and under	17.00 to 18.00
Car wheels	17.00 to 17.50
No. 1 railroad wrought.....	15.00 to 15.50
No. 1 yard wrought.....	13.00 to 13.50
No. 1 forge fire.....	9.50 to 10.00
Bundled sheets (for steel works)....	9.50 to 10.00
No. 1 busheling.....	12.00 to 13.00
No. 2 busheling.....	10.00 to 11.00
Turnings (short shoveling grade for blast furnace use).....	9.00 to 9.50
Mixed borings and turnings (for blast furnace use)	9.00 to 9.50
Machine-shop turnings (for rolling mill and steel works use).....	9.00 to 9.50
Heavy axle turnings (or equivalent) ..	9.50 to 10.00
Cast borings (for steel works and rolling mills)	11.50 to 12.00
Cast borings (for chemical plants) ..	12.00 to 12.50
No. 1 cast.....	17.00 to 17.50
Railroad grate bars	13.50 to 14.00
Stove plate (for steel plant use).....	13.50 to 14.00
Railroad malleable	13.50 to 14.00
Wrought iron and soft steel pipes and tubes (new specifications).....	12.00 to 12.50
Iron car axles.....	No market
Steel car axles.....	No market

W. J. Rainey, Inc., has appointed E. Arthur Tutein, Inc., Philadelphia, as sales agent for its coke in the Philadelphia district. The Philadelphia office of E. Arthur Tutein, Inc., including that of the Goshen Furnace Co. and the Thomas Iron Co., will be moved from the Finance Building to the Real Estate Trust Building.

Personnel Research Agencies

"Personal Research Agencies" is the title of a bulletin just issued by the United States Department of Labor, through its Bureau of Labor Statistics (No. 299). It is intended to serve as a guide to organized research in employment management, industrial relations, training, and working conditions.

About a year ago a conference was held in Washington, under the auspices of the Engineering Foundation and National Research Council to consider the practicability of bringing about co-operation among the many bodies conducting research relating to persons employed in industry and commerce, from management to unskilled labor. This conference, which was attended by 40 representatives of organizations of labor, manufacturers, employment managers, engineers, physicians, educators, economists, and social workers, requested the Bureau of Labor Statistics to undertake a survey of existing agencies whose activities include studies and investigations relating to the employee and his job. The above bulletin contains the results of this survey arranged in the form of a handbook for ready reference. It describes the research activities of about 300 bureaus, associations, foundations, laboratories, and university departments, which deal with the problems of an employment manager's office, vocational psychology, wage systems, cost of living and budgets, employee representation, training of managers, foremen and workmen, whether in educational institutions or in the factory, the relation of hours of labor, fatigue, lighting, ventilation, food, etc., to output and health of workers, occupational diseases and health hazards in the various industries, safety codes and appliances for the prevention of accidents, and the special problems connected with the employment of women and young persons, immigrants, colored workers, the handicapped or disabled, and the mentally deficient or unstable.

British Iron and Steel Market

Steel Situation Discouraging—Some Plants Closing—Pig Iron Reduction Did Not Stimulate Buying—Continental Steel Weak

(By Cable)

LONDON, ENGLAND, Dec. 6.

Cleveland pig iron was reduced 10s. (\$2.00) last week; but recent reductions are still insufficient to attract buyers. Hematite demand is slow and prices are weak. Foreign ore is unchanged. Belgian foundry iron is being offered, on six to eight weeks' shipment, at £4 2½s. (\$16.75) f.o.b.

There is a fair amount of inquiry for steel generally. British makers are competing keenly for export orders, prices down to £8 10s. (1.54c. per lb.) f.o.b., having been accepted for beams. General business, however, is not enough to keep the plants going and several mills are ceasing their operations.

Mannesmann Tube Co. secured a contract for boiler tubes for Russia. Continental steel is weak, Belgian merchant bars being quoted at £7 15s. (1.405c. per lb.) f.o.b., for shipment in February and March. For the same delivery, Belgian beams are held at £7 7½s. to £7 15s. (1.38c. to 1.405c. per lb.) f.o.b. Number 3 Belgian bar iron is quoted at £7 5s. (1.314c. per lb.) f.o.b. for February and March delivery.

Luxemburg merchant bars are quoted at £7 15s. (1.405c. per lb.) f.o.b., for shipment in six to eight weeks. German sheet bars are being sold at £6 10s. (\$26.39) c.i.f. Britain, for December and January delivery. German wire nails of the usual Japanese assortments are now sold at 24s. (\$4.87) cost and freight, for January and February shipment. German wire rods are held at £8 15s. to £9 (\$35.53 to \$36.54) f.o.b. for January and February delivery.

Tin plate is easier on offering of stock plates, resulting in realizing on stocks, and bear selling. Forward deliveries, January and February, are sold at 20¼s. (\$4.21) basis f.o.b. The home trade is purchasing odd sizes, 20¼s. being done f.o.b. Quarter wasters are sold also at 20¼s. f.o.b. ex-stock.

Galvanized sheet makers are anxious to book orders for January onwards. They have accepted £17 (3.08c. per lb.) basis f.o.b. for 24 gage sheets. Far-Eastern specifications for black sheets are nominal.

We quote per gross ton, except where otherwise stated, f.o.b. maker's works, with American equivalent figured at \$4.06 per £1 as follows:

Durham coke, delivered....	£1 10	\$6.09
Cleveland No. 1 foundry...	5 5 & £5 10*	21.32 & \$22.33*
Cleveland No. 3 foundry...	5 0 & 5 5*	20.30 & 21.32*
Cleveland No. 4 foundry...	4 15	19.29
Cleveland No. 4 forge.....	4 10	18.27
Hematite	7 0*	28.42*
East Coast mixed.....	5 7½ & 5 10*	21.82 & 22.33*
Ferromanganese	15 0 & 14 10*	60.90 & 58.87*
Rails, 60 lb. and up.....	9 0 to 10 10	36.54 to 42.63
Billets	7 5 to 8 5	29.44 to 33.50
Sheet and tin plate bars.		
Welsh	7 15	31.47
Tin plate base box.....	1 0½ to 1 2	4.08 to 4.47
		C. per Lb.
Ship plates	10 10	1.90
Boiler plates	14 0 to 16 0	2.54 to 2.90
Tees	10 10 to 11 10	1.90 to 2.08
Channels	9 15 to 10 15	1.77 to 1.95
Beams	8 10 to 10 10	1.54 to 1.90
Round bars, ¾ to 3 in.....	10 10 to 12 0	1.90 to 2.18
Galvanized sheets, 24 g....	17 0 to 17 5	3.08 to 3.13
Black sheets	14 10 to 15 0	2.63 to 2.72
Steel hoops	12 0 & 12 5*	2.18 & 2.22*
Cold rolled steel strip, 20 g. 24 10		4.44

*Export price.

The steel oil storage tanks for the new Mexia, Texas, oil field to be built by the Chicago Bridge & Iron Works by the Sinclair Crude Oil Purchasing Co., Tulsa, Okla., will include 50 of the 7-ring 80,000-bbl. capacity tanks. They will be steel throughout with 3/16-in. steel roofs and steel roof framing.

COMMENT ON MESSAGE

How President Harding's Recommendations on Important Measures Were Received

WASHINGTON, Dec. 6.—The sweeping change in the American system of making tariffs recommended by President Harding to the Sixty-seventh Congress in his message this afternoon created great interest. It had, however, been anticipated and therefore did not carry any surprise.

Of outstanding interest were his recommendation as to supervision of labor organizations and suggestions as to upbuilding of the merchant marine and the need of action toward further tax revision.

Views on the Tariff

Urging early legislation on the permanent tariff, the President recommended "flexibility and elasticity" so that rates may be adjusted to meet unusual and changing conditions which cannot be accurately anticipated. Recognition was given by the President to differences of opinion concerning the merit of the proposed American valuation plan and he stated that Congress should give the executive branch authority to proclaim American values, under prescribed conditions, on any given list of products imported. Where there are evidences of unfair practices due to conditions of exchange, the President's idea is to give the tariff commission power to recommend rates to meet changing economic situations. The President observed the constitutional questions involved, but made it plain that he is of the opinion there are none to prevent extension of the power suggested. It is altogether likely, however, that there will be considerable opposition in Congress to the plan.

Senator Smoot's Bill

That it will be taken up was shown by the fact that Senator Smoot, prominent member of the Finance Committee, immediately after the message was read, pre-

sented an amendment to the pending tariff bill providing for American valuation on imported products. Another amendment he introduced would empower the President to proclaim such tariff rates upon any commodity or group of commodities as would equalize advantages of competing domestic and foreign products. Although the proposed departure in tariff making would be distinct from the present system, the President said: "It is no radical departure in view of varying conditions and the disordered state of money values to provide American valuation, but there cannot be ignored the danger of such a valuation, brought to the level of our own production costs, making our tariffs prohibitive. It might do so in many instances where imports ought to be encouraged."

Industrial Courts

In dealing with the labor situation, the President suggested industrial courts to arbitrate disputes between capital and labor, which, it is believed, might follow the system of industrial tribunals in Kansas. He made it plain that labor organizations should be supervised and controlled as is done in the case of capital, but did not say specifically what regulation he has in mind, whether by incorporation or otherwise.

The President was known to favor continued suspension and probably actual repeal of that section of the merchant marine act providing preferential duties on goods shipped in American bottoms, which would call for abrogation of treaties. Because of this his suggestion for tolerance of Congress for "non-compliance for a very few weeks until a plan may be presented" was no surprise. The President soon will devote a special message to the merchant marine. He is known to favor ship subsidy and is expected to recommend such a system to upbuild the merchant marine. He also has indicated previously that he will recommend tax revision and his casual reference to this subject, to be taken up "later," only confirms the opinion that has prevailed, but is a source of gratification to business interests of the country.

ELECTRIC PLANTS FOR JAPAN

Contract for \$2,000,000 Awarded—Light Rails Bought for Lumbering—Tin Plate Inquiry

NEW YORK, Dec. 6.—Not only is Japanese trade showing more activity from week to week but purchases are appearing from large interests as well as small dealers and consumers. A notably large contract for electric material for the Far East has been closed by Takata & Co., 50 Church Street, New York, representing the Westinghouse Electric & Mfg. Co. in Japan. This contract, which totals slightly less than \$2,000,000, is for supplying large generators and other units for 154,000-volt electric transmission to the Daido Denrioku K. K. (Consolidated Electric Power Co.). Details of the installation have not yet been received from Japan. The Consolidated company is a producer of hydroelectric power, selling it to distributing companies for use in Tokio, Osaka and other cities. In Tokio this transmission of power is handled by the Tokio Electric Light Co., which recently closed a contract with Takata & Co. for Westinghouse material, totaling about \$600,000. This contract was let in conjunction with 610 transmission towers. While the wire was placed in the United States, the towers are being fabricated by the Ishikawajima Iron Works, a subsidiary of the Ishikawajima Dockyard Co., one of the largest dockyards in Japan. The steel was probably rolled in a British mill or came from the Imperial Steel Works in Japan. Another large purchase for hydroelectric work by the Japanese will probably be made in the near future for the Formosa hydroelectric project, inquiry on which has been in the market since early in the summer. This includes plates for bending into pipe, about 225 miles of transmission towers, heavy pipe and other equipment.

Japanese purchases of copper continue at intervals. One New York export house recently booked an order for 450 tons (1,008,000 lb.) of electrolytic copper for

shipment to Japan, probably to be consumed by wire mills, which are engaged in the manufacture of much of the wire for the electrical expansion that is taking place in Japan. Buying of light rails also continues, purchases being chiefly from governmental sources. The latest shipments seem to be largely rails of about 30-lb. section for use in lumbering on the island of Saghalien, north of Japan. One export house has recently booked orders for 1000 tons of 30-lb. rails for this use. One order of 500 tons of sheet bars is reported by a Japanese house and an inquiry is in the market for oil can tin plate, totaling about 12,000 base boxes.

Business with Germany

German competition is evidently no greater to-day than it was six months or a year ago. Price increases have kept pace with the mark's depreciation. Freight rates, however, are an aid to German export selling, but low ocean freights may be somewhat offset by the recent 50 per cent increase in German railroad freight from mills to ports of shipment and the addition of 4 per cent to the already large export duty levied by the German Government. Ocean freights from Hamburg to foreign points quoted in pounds sterling are generally 12s 6d (\$2.54) to Buenos Aires, Argentina, about 40s (\$8.12) to Hong Kong and Japanese ports, 40s 6d (\$8.22) to Shanghai, and 15s (\$3.04) to Bombay, India. German sellers are reported to have placed a fairly large amount of structural material in Argentina, their price f. a. s. Hamburg being now about the equivalent of 1.40c to 1.45c per lb. Pittsburgh.

Some inquiry has recently appeared from the Far Eastern markets for wire shorts. One exporter is now attempting to fill an order in hand for 15 tons of wire shorts. Wire shorts are purchased largely in the Far East, where labor is cheap. They are resold to individuals, who among other uses, roll them on spools for sale at retail. The shorts generally demanded are from 23 ft. to 75 ft. long. This is a product that, like the second hand plates and shapes used by the Chinese blacksmiths, was diverted to American mills by the war.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight Rates

Freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia, domestic...	\$0.35	Kansas City	\$0.815
Philadelphia, export...	0.265	Kansas City (pipe)...	0.77
Baltimore, domestic...	0.335	St. Paul	0.665
Baltimore, export	0.255	Omaha	0.815
New York, domestic...	0.38	Omaha (pipe)	0.77
New York, export	0.285	Denver	1.35
Boston, domestic	0.415	Denver (wire products)...	1.415
Boston, export	0.285	Pacific Coast	1.665
Buffalo	0.295	Pacific Coast, ship plates	1.335
Cleveland	0.24	Birmingham	0.765
Detroit	0.325	Jacksonville, all rail...	0.555
Cincinnati	0.325	Jacksonville, rail and	
Indianapolis	0.345	water	0.46
Chicago	0.38	New Orleans	0.515
St. Louis	0.475		

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 40,000 lb., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item the rate applies to a minimum of 50,000 lb., and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 55c.; ship plates, 75c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 75c.; sheets and tin plates, 60c. to 75c.; rods, wire rope, cable and strands, \$1; wire fencing, netting and stretcher, 75c.; pipe, not over 8 in. in diameter, 75c.; over 8 in. in diameter, 2 1/2 c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in., on one or both legs, 3/4 in. thick and over, and tees, structural sizes, 1.50c. to 1.60c.

Sheared plates, 3/4 in. and heavier, tank quality, 1.50c. to 1.60c.

Wire Products

Wire nails, \$2.75 to \$2.90 base per keg; galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of \$1.25 and shorter than 1 in., \$1.75; bright Bessemer and basic wire, \$2.50 to \$2.60 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$2.50 to \$2.60; galvanized wire, \$2.95 to \$3.10; galvanized barbed wire, \$3.40 to \$3.55; galvanized fence staples, \$3.40 to \$3.55; painted barbed wire, \$2.90 to \$3.05; polished fence staples, \$2.90 to \$3.05; cement-coated nails, per count keg, \$2.35 to \$2.45; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 68 to 70 1/2 per cent off list for carload lots, 67 to 69 1/2 per cent for 1000-rod lots, and 66 to 68 1/2 per cent for small lots, f.o.b. Pittsburgh.

Bolts, Nuts and Rivets

Large structural and ship rivets.....\$2.25 to \$2.40 base
Large boiler rivets.....2.35 to 2.50 base
Small rivets70, 10 and 5 to 70, 10 and 10 per cent off list
Machine bolts, small, rolled threads,
70, 10 and 5 to 70, 10 and 10 per cent off list
Machine bolts, small, cut threads,
70 and 5 to 70 and 10 per cent off list
Machine bolts, larger and longer,
65, 10 and 5 to 70 and 10 per cent off list

Carriage bolts, 3/4 in. x 4 in.:
Smaller and shorter rolled threads,
65, 10 and 10 per cent off list
Cut threads65 and 10 to 70 per cent off list
Longer and larger sizes65 and 10 to 70 per cent off list
Lag bolts70 and 10 to 70, 10 and 5 per cent off list
Plow bolts, Nos. 1, 2 and 3 heads.....60 and 10 per cent off list
Other style heads.....20 per cent extra
Machine bolts, c.p.c. and t. nuts, 3/4 in. x 4 in.:
Smaller and shorter.....65 and 5 per cent off list
Larger and longer sizes.....65 per cent off list
Hot pressed sq. or hex. blank nuts.....\$5.50 off list
Hot pressed nuts, tapped.....\$5.00 to \$5.25 off list
C.p.c. and t. sq. or hex. blank nuts.....\$5.25 off list
C.p.c. and t. sq. or hex. blank nuts, tapped.....\$5.00 off list
Semi-finished hex. nuts:
1/4 in. to 9/16 in. inclusive.....80, 10 and 10 per cent off list
Small sizes S. A. E.....80, 10, 10 and 10 per cent off list
3/8 in. to 1 in. inclusive, U. S. S. and S. A. E.,
70, 10, 10 and 10 per cent off list
Stove bolts in packages.....80, 10 and 5 per cent off list
Stove bolts in bulk.....80, 10 and 7 1/2 per cent off list
Tire bolts65, 10 and 10 per cent off list
Track bolts, carloads.....3.25c. to 3.50c. base
Track bolts, less than carloads.....4.25c. to 4.50c.

Upset Square and Hex. Head Cap Screws
1/4 in. and under.....75 and 10 to 80 and 10 per cent off list
9/16 in. to 3/4 in.75 and 10 to 80 and 10 per cent off list
Upset Set Screws
1/4 in. and under.....80, 10 and 5 to 85 per cent off list
9/16 in. to 3/4 in.80, 10 and 5 to 85 per cent off list
Milled Square and Hex. Cap Screws
All sizes70 and 10 per cent off list
Milled Set Screws
All sizes70, 10 and 5 per cent off list

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, \$38 to \$40; chain rods, \$38 to \$40; screw stock rods, \$43 to \$45; rivet and bolt rods and other rods of that character, \$38 to \$40; high carbon rods, \$46 to \$52, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes, 9/16-in. and larger, \$2.25 base per 100 lb. in lots of 200 kegs of 200 lb. each or more; spikes, 1/2-in., 3/8-in. and 7/16-in., \$2.40 base; 5/16-in., \$2.40 base. Boat and barge spikes, \$2.40 to \$2.50 base per 100 lb. in carload lots of 200 kegs or more, f.o.b. Pittsburgh. Track bolts, \$3.25 to \$3.50 base per 100 lb. Tie plates, \$2 per 100 lb. Angle bars, \$2.40 per 100 lb.

Terne Plates

Prices of terne plates are as follows: 8-lb. coating, 200 lb., \$9.30 per package; 8-lb. coating, 1 C., \$9.60; 15-lb. coating, 1 C., \$11.80; 20-lb. coating, 1 C., \$13.00; 25-lb. coating, 1 C., \$14.25; 30-lb. coating, 1 C., \$15.25; 35-lb. coating, 1 C., \$16.25; 40-lb. coating, 1 C., \$17.25 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars, 1.50c. to 1.60c. from mill. Refined bar iron, 2c. to 2.10c.

Welded Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card:

Butt Weld			Iron		
Inches	Steel	Galv.	Inches	Black	Galv.
1/2	54 1/2	28	1/4 to 3/8	3 1/2	+22 1/2
3/4	57 1/2	31	1/2	36 1/2	18 1/2
1	62 1/2	48	3/4	42 1/2	27 1/2
1 1/4	66 1/2	54	1 to 1 1/2	44 1/2	29 1/2
1 to 3	68 1/2	56			

Lap Weld		
2	61 1/2	49
2 1/2 to 6	65 1/2	53
7 to 8	62 1/2	49
9 to 12	61 1/2	48

Butt Weld, extra strong, plain ends		
1/2	50 1/2	33
3/4	53 1/2	35
1	59 1/2	48
1 1/4	64 1/2	53
1 to 1 1/2	66 1/2	55
2 to 3	68 1/2	56

Lap Weld, extra strong, plain ends		
2	59 1/2	48
2 1/2 to 4	63 1/2	52
4 1/2 to 6	62 1/2	51
7 to 8	58 1/2	45
9 to 12	52 1/2	39

To the large jobbing trade the above discounts are increased by one point, with extra discounts of 5 and 2 1/2 per cent.

Boiler Tubes

The following are the discounts for carload lots f.o.b. Pittsburgh:

Lap Welded Steel		Charcoal Iron	
1 1/4 in.	26 1/2	1 1/2 in.	5
2 to 2 1/4 in.	41	1 3/4 to 1 7/8 in.	15
2 1/2 to 3 in.	52	2 to 2 1/4 in.	25
3 1/4 to 13 in.	57	2 1/2 to 3 in.	30
		3 1/4 to 4 1/2 in.	32

Standard Commercial Seamless Boiler Tubes

New discounts have been adopted on standard commercial seamless boiler tubes, but manufacturers are not yet ready to announce them for publication, and for that reason we publish no discounts this week.

Sheets

Prices for mill shipments on sheets of standard gage in carloads, f.o.b. Pittsburgh, follow:

Blue Annealed		Cents per Lb.	
No. 8 and heavier.....	2.20	Nos. 11 and 12.....	2.30
Nos. 9 and 10 (base).....	2.25	Nos. 13 and 14.....	2.35
		Nos. 15 and 16.....	2.45

Box Annealed, One Pass Cold Rolled		Cents per Lb.	
Nos. 17 to 21.....	2.80	No. 28 (base).....	3.00
Nos. 22 to 24.....	2.85	No. 29	3.10
Nos. 25 and 26.....	2.90	No. 30	3.20
No. 27	2.95		

Galvanized		Cents per Lb.	
Nos. 10 and 11.....	3.00	Nos. 25 and 26.....	3.70
Nos. 12 to 14.....	3.10	No. 27	3.85
Nos. 15 and 16.....	3.25	No. 28 (base).....	4.00
Nos. 17 to 21.....	3.40	No. 29	4.25
Nos. 22 to 24.....	3.55	No. 30	4.50

Tin-Mill Black Plate		Cents per Lb.	
Nos. 15 and 16.....	2.80	No. 28 (base).....	3.00
Nos. 17 to 21.....	2.85	No. 29	3.05
Nos. 22 to 24.....	2.90	No. 30	3.05
Nos. 25 to 27.....	2.95	Nos. 30 1/2 and 31.....	3.10

NON-FERROUS METALS

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York			Lead		Zinc	
	Lake	Electro-lytic	Tin New York	New York	St. Louis	New York	St. Louis
Nov. 30.....	13.50	13.37½	29.87½	4.70	4.35	5.15	4.65
Dec. 1.....	13.50	13.37½	30.37½	4.70	4.40	5.25	4.75
2.....	13.50	13.37½	31.00	4.70	4.40	5.25	4.75
3.....	13.50	13.37½	....	4.70	4.40	5.30	4.80
5.....	13.75	13.50	31.50	4.70	4.45	5.35	4.85
6.....	13.75	13.50	31.75	4.70	4.45	5.37½	4.87½

New York

NEW YORK, Dec. 5.

Every one of the leading metals is more active and higher. Buying of copper continues, and prices have advanced again. The tin market is once more active and prices have advanced. Demand for lead has increased and prices are firmer. The zinc market also shows more activity at slightly higher levels.

Copper.—The electrolytic copper market continues to advance on increased buying for both domestic and foreign consumption. Prices vary, depending on the seller, and range from 13.75c. to 14c., delivered, or 13.50c. to 13.75c., refinery, for spot and this year's delivery, with January and first quarter ranging generally from 14c. to 14.25c., delivered. At the minimum levels the amount of copper available for this year's delivery is not large and in more than one case producers refuse to sell, not only at those levels but at even the higher prices. The principal buying is for January and first quarter delivery and the demand is quite general. For foreign consumption the minimum seems to be 14c., f.o.s., with Germany and England the leading purchasers. Japan purchased 450 tons during the week. It is estimated that total sales for November were 190,000,000 lb., as compared with 140,000,000 lb. for October. November sales therefore were the largest for any month this year. Production still continues at about 40,000,000 lb. per month. Estimates of delivery into consumption have not yet been made but without doubt they were higher than in October, when they were about 110,000,000 lb.

Copper Averages.—The average price for Lake copper for the month of November, based on daily prices in THE IRON AGE, was 13.37c. The average price of electrolytic copper was 13.07c.

Tin.—Demand for Straits tin has again become active and the market is stronger and higher. Last week a fair business was done at close to 30c., above or below, depending on the position. On Saturday also there was a little business at the same levels. Yesterday very heavy sales were made, estimated at between 500 and 750 tons for all positions, with prompt and nearby delivery selling at 31.25c. to 31.50c., and with the far off positions at 31.50c. to 31.75c. Sales at 32c. were also reported. Consumers were the principal buyers yesterday, with dealers taking perhaps one-quarter to one-third of the total. To-day only a slight business was reported, with the market closing at 31.75c. for spot Straits, New York. Electrolytic tin has sold at 31.50c. New York. The London market is featured by higher prices and heavy sales. For the week covered by this report, or since Nov. 30, sales in that market amounted to over 4250 tons, which represent an unusually active market. Prices have also advanced, the quotation to-day having been £167 17s. 6d. for spot standard, £169 10s. for future standard and £168 78s. 6d. per ton for spot Straits. Deliveries of tin into consumption in November are reported as 3250 tons, with stocks and the quantity landing on Nov. 30 at 1316 tons. Imports for the first 11 months of this year were 20,668 tons against 48,093 tons for the first 11 months in 1920. The quantity afloat is reported at 4650 tons with arrivals thus far this month at 580 tons.

Lead.—Demand has increased and the market has

stiffened. The leading interest continues to quote 4.70c., New York and St. Louis, at which it continues to take business, but in the outside market sales have been made at points outside of New York as high as 4.75c. and 4.77½c., delivered. The market at St. Louis is firmer, independent sellers asking 4.45c. for early delivery. The strength of the London market and the scarcity of the metal there continue to attract attention.

Zinc.—There is more demand from galvanizers who need the metal for immediate consumption and the market for prime Western is higher, due to this demand, as well as to the continued indifference of large producers to sell freely. For early delivery or 30 days' delivery prime Western is quoted at 4.87½c., St. Louis, or 5.37½c., New York.

Antimony.—The market is quiet and wholesale lots for early delivery are quoted at 4.50c., New York, duty paid, with prompt metal at 4.55c.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is quoted by the leading interest in wholesale lots for early delivery at 19c., f.o.b. plant, with the same grade available from importers at 17c. to 18c., New York, duty paid.

Old Metals.—Business is better and metals are held firm. Dealers' selling prices are nominally as follows:

	Cents Per Lb.
Copper, heavy and crucible.....	13.00
Copper, heavy and wire.....	12.00
Copper, light and bottoms.....	9.75
Heavy machine composition.....	10.00
Brass, heavy.....	7.75
Brass, light.....	6.00
No. 1 red brass or composition turnings.....	8.25
No. 1 yellow rod brass turnings.....	6.00
Lead, heavy.....	4.25
Lead, tea.....	3.25
Zinc.....	3.00

Chicago

DEC. 6.—Copper, tin and zinc have advanced not because of active buying but rather on account of a concerted effort on the part of producers to secure satisfactory prices. Further advances in the old metals reflect the greater firmness in new material. We quote in carload lots: Lake copper, 13.75c.; tin, 32.25c.; lead, 4.45c.; spelter, 4.95c.; antimony, 6.50c., in less than carload lots. On old metals we quote: Copper wire, crucible shapes and copper clips, 10c.; copper bottoms, 8c.; red brass, 8c.; yellow brass, 5.25c.; lead pipe, 3c.; zinc, 2.25c.; pewter, No. 1, 22c.; tin, foil, 23c.; block tin, 25c.; all buying prices for less than carload lots.

St. Louis

ST. LOUIS, Dec. 5.—Both lead and zinc are stronger. We quote lead at 4.45c., carlots, against 4.25c. last week, and zinc at 4.70c. to 4.80c., against 4.62½c. last week. We quote Lake copper, 14.48½c., car lots; tin, 31.86c., and antimony, 5.08½c. On old metals we quote: Light brass, 3.50c.; heavy red brass and light copper, 7c.; heavy yellow brass, 4c.; heavy copper and copper wire, 7.50c.; zinc, 2c.; pewter, 15c.; tin foil, 16c.; tea lead, 2c.; aluminum, 9c.

Competition in Line Pipe

YOUNGSTOWN, Dec. 6.—Demand for line pipe is still lively, but competitive conditions have forced down prices to the point where they are unattractive for a number of producers. The advantage of Chicago pipe producers in periods of close competition is indicated by the fact that some very attractive business has lately gone to Chicago makers.

The Chicago district has a freight rate advantage over the Youngstown district of about \$7 per ton in shipping pipe and casing to the Southwestern oil fields.

The 781 building permits issued in St. Louis during November represented improvements of the value of \$975,125. In November, 1920, 574 permits were issued for improvements of the value of \$523,730. The building permits issued in 1921, up to Nov. 30, represent construction costing \$15,651,585, as against \$17,694,078 for the entire year of 1920.

PERSONAL

M. A. Hanna & Co., Cleveland, have announced a number of changes in their sales organization. George A. Maltby, who has been located at the firm's Detroit office, has been named resident agent at the Buffalo office, and associated with him will be P. F. Murray and F. C. Mosedale, the latter being named special representative. B. S. Stephenson, formerly in charge of the firm's Pittsburgh office, and later transferred to Cincinnati in the same capacity, has been appointed resident agent at the Detroit office and will also continue to have charge of the Cincinnati office. E. Kay Ford will be associated with him in the Detroit office and H. D. Comey and William Kerber in the Cincinnati office.

Dr. Colin G. Fink, consulting electrometallurgist, New York, has been appointed by the board of directors of the American Electrochemical Society to the position of acting secretary to serve during the unexpired term of Dr. Joseph W. Richards.

W. J. Clucas has been appointed special representative in Western New York for the Lancaster Steel Products Corporation, manufacturer of cold rolled and cold drawn steel.

Louis J. Campbell, president Electric Alloy Steel Co., Youngstown, Ohio, is convalescing from an attack of pneumonia, and has not yet resumed his duties.

Joseph G. Butler, Jr., vice-president Brier Hill Steel Co., Youngstown, Ohio, is planning an addition to the Butler Art Gallery at Youngstown, which he erected and fitted with a collection of paintings, for the people of the Mahoning Valley.

G. H. Rehling has been appointed district sales manager for the Wyckoff Drawn Steel Co., Pittsburgh, for the Southwestern Ohio territory, with headquarters at Dayton, Ohio.

John B. Dobson, who has been Southeastern manager at Atlanta for Warren Webster & Co., Camden, N. J., steam heating system manufacturer, for more than 17 years, on account of ill health, has found it necessary to give up active work in the South. He has been transferred to the home office organization at Camden. Edward W. Klein has been appointed Southeastern district manager, and L. C. Boland will continue as district engineer, maintaining the present office at 1318 Atlanta Trust Co. Building, Atlanta. The company will also maintain an office at Charlotte, N. C., in the Commercial Bank Building, with which Charles F. White will be associated as Sales Engineer. The Charlotte office will also be in charge of Mr. Klein, as Atlanta will be the principal selling office. Mr. White has been transferred from the home office organization.

R. M. Derby, export manager Niles-Bement-Pond Co., 111 Broadway, New York, who has just returned from a six weeks business trip to Mexico, during which time he made his headquarters in Mexico City and made trips to the outlying districts, says that Mexico is in many ways evidently running behind financially, probably because of lack of recognition by the United States and the consequent check to American banking. Business is at a low ebb, as the government there cannot buy except on credit and individual purchasers must pay cash. The railroads, which recently purchased a large number of locomotives from the Baldwin Locomotive Works, on a long term credit arrangement, are in great need of machine shop facilities. Representatives of car manufacturers in Mexico seem not inclined to extend the credit necessary for the car purchases desired. Mr. Derby brought back a few small orders for machine tools. He found the country itself in a prosperous condition and law and order prevailing, large business alone waiting on action by the United States.

Col. Samuel M. Nicholson, president and general

manager Nicholson File Co. and president American Screw Co., Providence, R. I., has been made chairman of the board of directors of the International Trust Co., Providence, to succeed the late Col. Samuel P. Colt.

J. E. Osmer, Detroit, superintendent of power and master car builder of the Ann Arbor Railroad for nine years, has resigned his position. He has no definite plans for the future.

W. M. MacCleary has been appointed New York district manager for the Warren Iron & Steel Co., Warren, Ohio, with offices at 2 Rector Street. He has been in the steel business for many years, having been associated with the Whitaker-Glessner Co., Portsmouth, Ohio. During the war he had charge of the raw material purchases in the Ordnance Department, holding the rank of colonel.

O. C. White, formerly agent in the Fort Worth, Tex., territory for the Youngstown Boiler & Tank Co., Youngstown, Ohio, has been appointed sales manager in the Southwest, with headquarters at 801 North Houston Street, Fort Worth.

William Rosenthal, for years traveling representative of the Hyman-Michaels Co., Chicago, dealer in iron and steel scrap and relaying rails, has been placed in charge of the company's St. Louis office at 2115-18 Railway Exchange Building. The company maintains extensive yards in St. Louis.

Thomas Hoops, Jr., has resigned as general manager and a director of Wilcox, Crittenden & Co., Inc., Middletown, Conn. He had been connected with the company for 22 years.

Oswald Fowler, of the non-ferrous department of Rogers, Brown & Co., New York, sailed Tuesday on a business trip to Norway, Sweden and Great Britain in the interest of the firm.

Harry Coulby, president Pittsburgh Steamship Co., Cleveland, and John C. Chandler, Cleveland district sales manager Lackawanna Steel Co., sailed for Europe Dec. 7 and will spend four months abroad. During Mr. Chandler's absence, E. B. Thomas, who is connected with the Chicago office of the Lackawanna Steel Co., will have charge of the Cleveland district sales office.

Horace B. Spackman, president Allegany Ore & Iron Co., owned by the Lukens Steel Co., was elected president of the Eastern Pig Iron Association at its monthly meeting in Philadelphia on Dec. 2.

A. D. Keene, electric furnace engineer General Electric Co., Schenectady works, is now with the Pittsburgh Electric Furnace Corporation as engineer on electric furnace designs and applications in the steel and metal industries. He has had practical experience in the design of electric furnaces and ovens for diverse applications. His joining with the 'Lectromelt Furnace forces indicates a broadening out of its line, which has heretofore been confined to melting and refining furnaces for steel, iron and brass; bronze and ferro-alloys. He has moved his residence from Schenectady to Pittsburgh.

M. H. Roberts, chief engineer Franklin Railway Supply Co., Inc., New York, is chairman of a board of engineers recently appointed by H. Foster Bain, director Bureau of Mines, to study the production of helium in Texas.

Washington Steel & Ordnance Co. Dissolved

WASHINGTON, Dec. 6.—The Washington Steel & Ordnance Co., Giesboro, D. C., has been dissolved by action of its stockholders. Having completed all of its contracts, it is said the plant will not be operated again. It was formerly a branch of the Firth-Sterling Steel Co., but in 1911 was established as a private corporation under the laws of West Virginia. The officers of the corporation were Corcoran Thom, president; Lewis J. Firth, chairman of board; James W. Kinnean, Pittsburgh, vice president; Roy B. McKenna, E. B. Clarke, William E. Dalton and H. F. Clarke, directors.

OBITUARY

BENJAMIN E. D. STAFFORD, vice-president and general manager Flannery Bolt Co., Pittsburgh, died Nov. 30, at Atlantic City, where he had gone for his health. He was born in Brooklyn, Feb. 25, 1866. Prior to becoming associated with the Flannery Bolt Co. in 1904, he had been with the Hopedale Machine Co., now the Draper Corporation, the B. M. Jones Co., Boston, and the Ewald Iron Co., Louisville, Ky. He retired from active business about two years ago on account of ill-health and had been living on his farm at Millvale, N. J. Mr. Stafford was a member of the American Society for Testing Materials, the American Society of Mechanical Engineers and the National Geographic Society.

JOHN J. NOLAN, vice-president, secretary and director Dravo Contracting Co., Pittsburgh, dropped dead at the Pittsburgh Country Club on the afternoon of Dec. 1. Following his participation in a golf tournament, he complained of not feeling well and went out in front of the club to revive. Death, it is believed, was due to apoplexy. Mr. Nolan had been with the Dravo Contracting Co. for 20 years. He was born in Carbondale, Pa., 45 years ago, and was graduated from Lehigh University in 1901, joining the Dravo company that year. He was a member of the University, Duquesne and Union clubs of Pittsburgh.

J. H. PRICE, secretary-treasurer Washington Coal & Coke Co., Dawson, Pa., died suddenly at his home in that town, Dec. 5. He had been ill for several weeks and only recently returned from Battle Creek, Mich., apparently in restored health. Prior to his connection with the coal and coke business, Mr. Price had been associated with the American Steel & Wire Co., Cleveland, and with another wire company at Milwaukee.

M. C. WILLIAMS, for many years in the steel industry, died at the home of his son, Charles H. Williams, Terre Haute, Ind., on Nov. 29. He started in the steel business as a young man and served in various capacities, including those of roller, manager and mill owner. He had lived a retired life on the farm for the past 10 years.

JAMES D. IRELAND, for the last five years member of the firm of M. A. Hanna & Co., Cleveland, died Dec. 6 after a year's illness, aged 43. He was general manager of the iron ore mines of M. A. Hanna & Co. for seven years previous to becoming a member of the firm, and since he had become a partner he had had charge of the firm's iron ore and anthracite coal mines.

ARNOLD HINKINS, president Butler Street Foundry & Iron Co., Chicago, which he organized in 1891, died of pneumonia on Dec. 1. Mr. Hinkins was born in Holland on March 20, 1843, and came to America in 1849, settling in Chicago in 1856.

FRANK A. HYDE, Boston, manufacturer of safes and strong-boxes, died Nov. 29 at the Malden Hospital, Malden, Mass., in his sixty-fifth year, following a recent serious operation.

HENRY D. ATWOOD, Taunton, Mass., for a long period head of the Phenix Crucible Co., died Nov. 29. He was born in Taunton in 1838.

WALTER HERBERT WESSON, Springfield, Mass., manufacturer of firearms, died Nov. 29. He was born at Grafton, Mass., Jan. 23, 1850.

The Aluminum Goods Mfg. Co., Manitowoc, Wis., with branch factories in Newark, N. J., and Two Rivers, Wis., has recently increased its operating forces to 3000 and placed its main factory in Manitowoc on a 24-hr. schedule to fill orders for stamped aluminum utensils and drawware. Deliveries during November were the largest in any single month in the history of the company and unfilled orders Dec. 1 were the largest on record.

GERMAN PRICES SOARING

Export Prices Unchanged When Translated into Dollars—Dollar Quotations Appear in Domestic Transactions

(Special Correspondence)

BERLIN, GERMANY, Nov. 20.—Judging by events of the past week Germany is well on the road to Austrian high prices and the time may not be far distant when German prices will be quoted in five figures. The chaotic conditions of a fortnight ago have now crystallized into a definite upward trend. Prices are increasing at an alarming rate and can only be regarded as nominal, virtually any price being paid for quick delivery. In the absence of mill quotations, warehouses, brokers and resellers are ruling the situation.

Bar iron has now reached 6400 m. compared with 4200 m. two weeks ago, but the contrast is even more marked when compared with quotations during July and converting figures into dollars. On July 12, 1921, bar iron was quoted at 1800 m., equal to \$23.25 at the day's rate of exchange. Last week's quotation of 6400 m. exceeds the July price by 4600 m. or 255 per cent, but the dollar price remains practically unchanged, working out at about \$23.68. Consequently foreign buyers have not been put at a disadvantage by the rising domestic prices and Germany is still in a position to export at a fair margin of profit. This exporting capacity will be severely tried, however, when mills begin to sell finished products made of foreign raw materials purchased at current prices unless aided by a further corresponding depreciation of her currency. This has been exactly the case since the conclusion of the war but this state of affairs cannot continue indefinitely and a repetition of the stagnant period prevailing throughout the spring and summer of 1920, only on a greater scale, is feared by many.

The desperate financial position of Germany has led in many instances to the dollar taking the place of the mark in the domestic market. Baltic ore shippers adopted that practice some time ago with a view to protecting themselves against loss, but there are also many instances of the dollar substituting the mark in transactions between domestic works. Ever since the boom started there has been strong opposition by consumers to price advances, held to be justified by the producers because of the increases in production costs. Producers not only failed to score but they were unsuccessful in attempting to reintroduce sliding scale quotations. It now appears that the dollar standard offers a new basis for transactions and firms operating on this basis are obviously convinced of a further deterioration of the mark.

Quotations during the past week were changing rapidly. Disregarding high prices paid under exceptional conditions, we quote as follows in marks per metric ton:

Bar iron	6,400
Flats and rounds.....	6,250
Angles	6,400
Concrete bars	6,500
Squares	6,000
Soft bolt and nut stock.....	7,750
Hoop iron	6,200
Hoop iron, box band quality.....	8,600
Sheets, heavy	5,700
Sheets, medium	6,850
Plates, light, acc. to gage.....	9,800 to 11,500

The price advance recently decided upon by the Association of German Rivet Manufacturers has been followed by a further increase.

The Baker Mfg. Co., Evansville, Wis., manufacturer of gasoline engines principally for farm purposes, on Dec. 1 enlarged its operating schedules from three 8-hr. to six 8-hr. days a week, to bring production to a level with unfilled orders. A horizontal reduction of 25 per cent in wages was placed in effect at the same time.

Machinery Markets and News of the Works

RAILROAD PROSPECTS

Outlook for Substantial Buying by Carriers Grows Brighter

Rock Island Expected to Place Orders Soon for About \$800,000 Worth of Shop Equipment—List of 70 Tools Issued

Prospects of machine-tool orders from the railroads grow considerably brighter. It is reported from Chicago that the Rock Island Lines are said to feel that they can now buy at satisfactory prices and preparations are being made to place large orders, which may aggregate in value about \$800,000. Of this amount \$300,000 is from the 1921 budget, for tools authorized but not purchased this year, and \$500,000 is scheduled on the 1922 budget. The Rock Island has issued a list calling for bids on about 70 machines, many of large type. The Illinois Central and Chicago & North Western are also preparing large lists for 1922.

The Chesapeake & Ohio Railroad closed bids on Nov. 28 on about 20 tools and may buy shortly, while the Virginian Railroad is expected to send out new lists for about 20 tools. The latter road recently placed orders for a number of machines. The Big Four Railroad is in the market for a 300-ton wheel press.

The New York City Board of Education took bids

this week on another list of machine tools for vocational training schools. This list included about 80 tools, and in addition there was a large quantity of small tools, supplies, etc.

One of the largest single orders of the week in Chicago was placed by the Hurley Machine Co., that city. Fifteen power presses, costing about \$20,000 were purchased.

The American Car & Foundry Co., New York, which inquired last week for 35 machine tools, is expected to place its orders very quickly, as contracts have been let for the company's addition at Schenectady, for which these tools are intended.

Recent developments in the oil fields of the Southwest point to the possible development of some machine-tool business in that district.

Year-end liquidation of inventories is bringing more used tools into the market. The General Motors Corporation is collecting all of the surplus tools from its various plants and is storing them in the old factory of the Northway Motor & Mfg. Co., Detroit, preparatory to placing them on sale through various dealers. It is expected that about 1500 or 1600 machines will be offered for sale.

The Standard Parts Co., Cleveland, has decided to dispose of the tools in its American Ball Bearing plant, numbering 50 to 100, and these will be offered for sale shortly.

New York

NEW YORK, Dec. 6.

It is expected that the American Locomotive Co., New York, will place orders very soon against its inquiry for 35 miscellaneous machine tools, published in THE IRON AGE of Dec. 1. Contracts have been let for the addition to its Schenectady plant, for which the tools are intended, hence there is apt to be no unusual delay in the closing of the business.

The New York City Board of Education has asked for bids on another list of machine tools, bids closing tomorrow, Dec. 7. The list includes the following items, in addition to a large number of small tools, supplies, etc.: For a forge shop: 14-in. sensitive drill, 20-in. upright drill, 14-in. wet tool grinder and 10-in. dry grinder; for mechanical laboratory: Olsen testing machine, Olsen duplex micrometer extensometer, six Riehle Brothers' testing machines of various types; for machine shops: 20-in. fixed-head drill press, one United States hand milling machine, two 14-in. sensitive drills, two 14-in. Blount wet tool grinders, two 11-in. x 4 ft. speed lathes, one 3 x 3 in. power hack saw, 10 to 12 in. blade, equivalent to Marvel No. 1; one Hendey No. 5 special manufacturing milling machine, 35 12-in. x 5 ft. engine lathes, Hendey or Pratt & Whitney; one surface grinder, Walker No. 2; six Hardinge Brothers' bench lathes, one Stewart triple purpose furnace, one Stewart No. 3 pressure blower, one Segal key-filing machine, one Blount dry grinder, 12 x 2 x 1 in., one Blount 20-in. wet tool grinder, one American positive pressure blower, one American oven furnace, one Wisconsin hand milling machine, one Monarch engine lathe, 10 in. x 5 ft.; one Star engine lathe, 11 in. x 4 ft.; one Worcester engine lathe, 12 in. x 4 ft.; one Shepard engine lathe, 10 in. x 4 ft. 3 in.; one Flather engine lathe, 12 in. x 5 ft.; one Wells special lathe, 11 in. x 4 ft.; one Rhodes 7-in. horizontal crank shaper, one Washburn 14-in. sensitive drill, one Superior 20-in. drill, one Blount speed lathe, 11 in. x 4 ft.

Machine-tool business continues quiet, with some improvement in inquiry for used tools. December is not expected to be an active month, but the local trade is looking for better buying shortly after the new year.

Present activity in the crane market has been affected by the fact that the end of the year is approaching. The bids submitted on the 34 gantry cranes for the two piers of the Pan-American Terminal & Dock Co., at Stapleton, S. I., have been rejected. An irregularity was claimed by one bidder to exist in the low bid, but the Corporation Counsel of the city of New York declared all bids regular. It was decided by the Board of Estimate and Apportionment that lower prices might be obtained by a second tender. Specifications and conditions of bidding are unchanged. New bids were advertised by the Commissioner of Docks on Dec. 8 and bidding will close Dec. 21. A request for bids on 18 electric cranes of 3-ton, 5-ton and 10-ton capacities has been made by a dealer in New York. These cranes are reported to be for a company in Yonkers, N. Y. An export inquiry is in the market for 12 electric cranes, ranging from 4-ton to 5-ton capacities. George B. Spearin, 90 West Street, New York, has been receiving bids on a 15-ton, 33-ft. span hand power crane, which is included in a contract for the Passaic Valley Sewage Commission and will be erected at the Wallington Pumping Station, Wallington, N. J.

Among recent sales is a 25-ton, 37-ft. 10-in. span, stationary gantry crane placed with Niles-Bement-Pond Co. by the Erie Railroad and to be erected at Twenty-eighth Street and Thirteenth Avenue, New York, replacing a 15-ton hand power gantry crane. Other bidders were New Jersey Foundry & Machine Co., Toledo Crane Co., Northern Engineering Works and N. B. Payne, 25 Church Street, New York. The American Car & Foundry Co. has purchased three 5-ton overhead traveling cranes of 90-ft., 70-ft. and 58-ft. spans from the Pawling & Harnischfeger Co., two for its St. Louis plant and one for Depew, N. Y.

The Hoover Wagon Co., York, Pa., manufacturer of automobile bodies, has purchased the two-story factory at Webster Avenue and the Boulevard, Long Island City, comprising about 18,000 sq. ft., for a branch plant.

The Wells & Diamond Iron Works, 335 East Thirty-fourth Street, New York, has awarded contract to Louis Brooks, 5 East Fortieth Street, for a branch plant, 50 x 80 ft., at Whitlock Avenue and 149th Street, estimated to cost about \$17,000.

Plans for a four-story ice-manufacturing and storage plant on Webster Avenue, estimated to cost about \$100,000

with machinery, are being prepared by W. H. Meyer, architect and engineer, 1861 Carter Avenue, New York. The owner's name is withheld temporarily.

In addition to the erection of a factory extension, 61 x 176 ft., the Royal Metal Furniture Co., 125-9 Eighth Street, Brooklyn, has filed plans for improvements to its present works, to cost about \$12,000.

George E. Gratz, Jr., Brooklyn, operating a plant at 1143 DeKalb Avenue, for the manufacture of wrought iron products and specialties, will soon take bids for a one-story addition, 22 x 86 ft. Louis Allmendinger, 20 Palmetto Street, is architect.

The Robert Dollar Steamship Co., 11 Moore Street, New York, will expend about \$375,000 for the installation of equipment and refitting of the vessel, *Calico*, recently acquired from the United States Shipping Board. The power will be changed from coal-burning to oil-operated.

The Pierce Oil Corporation, 25 Broad Street, New York, has disposed of a bond issue totalling \$2,000,000. It operates an oil refinery at Dallas, Tex., with daily capacity of 48,000 bbl. which will be increased to 54,000 bbl.

Ovens, conveying equipment, power apparatus and other mechanical equipment will be installed in the new plant to be erected by the General Baking Co., 45 East Seventeenth Street, New York, on property purchased on 144th Street. The works will aggregate about 180,000 sq. ft. of floor area. William Deininger is president.

The Iroquois Door Co., Bridge and Tivoli streets, Albany, N. Y., has awarded contract to the Feeney & Sheban Building Co., 164 Montgomery Street, for a one-story building, 100 x 100 ft.

The Colonial Steel Co., Pittsburgh, has leased the two and three-story buildings at 149-51 Varick Street, New York, from the Garvin Machine Co., for a factory branch.

The Tide Water Oil Co., 11 Broadway, New York, has leased the first floor of the factory now being erected at Borden Avenue and Van Dam Street, Long Island City, for a new machine and repair shop.

A vocational department will be installed in the junior and high school building to be erected at Pennsylvania Avenue and South Main Street, Elmira, N. Y., preliminary plans for which are under way. Pierce & Bickford, 118 Lake Street, are architects.

The Hamilton Industrial Corporation, Hamilton Street, Albany, N. Y., will build a one-story power house at its new two-story factory, 50 x 240 ft., East Greenbush, N. Y., contract for which has been awarded to the Austin Co., 217 Broadway, New York.

Following the leasing of its car and locomotive repair shops at Hornell, N. Y., and Marion Ohio, the Erie Railroad Co., 50 Church Street, New York, is perfecting arrangements for similar private operation of its shops at Youngstown, Ohio.

The Stowell Mfg. Co., 260 Culver Avenue, Jersey City, N. J., manufacturer of roofing products, has awarded contract to the Turner Construction Co., 244 Madison Avenue, New York, for a two-story, reinforced-concrete building, 75 x 100 ft., to replace a structure recently destroyed by fire.

Christian Feigenspan, Inc., 50 Freeman Street, Newark, N. J., will soon commence the erection of an ice-manufacturing and cold storage plant, totalling about 30,000 sq. ft., at Bishop and State streets, Jersey City, N. J., with initial capacity of approximately 300 tons per day.

F. Bach, 21 Leonard Street, Jersey City, has filed plans for a one-story machine shop.

A vocational department will be installed in the two-story high school, 146 x 262 ft., to be erected at Summit, N. J., for which bids are being taken until Dec. 19. Pamela W. Lyall is secretary of the board.

The Bates Mfg. Co., Lakeside Avenue, West Orange, N. J., manufacturer of numbering machines and parts, has purchased the three-story factory on North Day Street, previously occupied by the Vosburgh Miniature Lamp Co., for a new plant. For some time past the company has been located at the Thomas A. Edison works. It was incorporated recently under state laws with capital of \$200,000, to provide for expansion.

A vocational department will be installed in the two-story and basement junior high school at First Avenue and Loomis Street, Elizabeth, N. J., estimated to cost about \$700,000. C. Godfrey Poggi, 275 Morris Avenue, is architect.

The Kolb Sheet Metal Works, Newark, has acquired the factory at 175-79 Vanderpool Street, for the establishment of a plant to manufacture blower and exhaust ventilating equipment, heavy metal work, etc. Norman L. Kolb heads the company.

Phineas Jones & Co., 305 Market Street, Newark, manufacturer of automobile bodies, wagons, etc., are taking bids

for a one-story plant, 50 x 300 ft., on Hillside Avenue, Hillside, estimated to cost about \$300,000, including machinery. William E. Lehman, 738 Broad Street, is architect.

The General Electric Co., Harrison, N. J., has filed plans for the construction of a one-story lamp manufacturing factory at Nineteenth and Springdale avenues, East Orange, N. J., estimated to cost about \$12,000, exclusive of equipment.

The Erie Railroad Co., 50 Church Street, New York, has preliminary plans under way for rebuilding its piers at Weehawken, N. J., recently destroyed by fire with a loss of \$1,500,000, including freight-handling machinery, etc. R. C. Falconer, company address, is engineer.

The Bell Electric Motor Co., Garwood, N. J., has changed hands and is now being conducted by new officers. Business will be carried on in the same location with increased facilities under the same name.

Chicago

CHICAGO, Dec. 5.

As the last month of the year opens, dealers find current business slightly improved and prospects of orders, particularly from the railroads, considerably brighter. The Illinois Central is preparing a large list of its 1922 needs and the Chicago & North-Western has been working on its 1922 budget for several weeks. Revised quotations are being made on the Santa Fe list, as noted a week ago.

The Rock Island, which has held purchases in abeyance for months, has issued the following list:

- One 600-ton hydrostatic driving wheel press, 90 ft. between rails;
- Six 60-ton hydrostatic driving box and rod presses;
- Eight 36-in. upright drill presses;
- One 48-in. heavy duty radial drill for drilling and boring cross heads;
- One 1½-in. double head stay bolt cutting machine;
- Two 1½-in. triple head bolt cutters;
- Three 2-in. double head bolt cutters;
- One Universal grinder, 36 in. between centers, with 12-in. swing;
- Two double car axle lathes;
- One 2-in. x 26-in. turret lathe;
- One 3-in. x 18-in. turret lathe;
- Two 3-in. x 36-in. turret lathes;
- One 16-in. tool room lathe;
- One 18-in. x 36-in. gap lathe;
- Nine 18-in. x 72-in. centers, double back geared engine lathes;
- One 48-in. steel tired car wheel lathe;
- One 26-in. heavy duty shaper;
- One 20 x 96-in. double back geared engine lathe;
- Five 24-in. double back geared engine lathes, 72 in. between centers;
- Two 36-in. double back geared engine lathes, 72 in. between centers;
- Four 36-in. x 36-in. x 12-ft. heavy duty planers;
- One power hack saw to handle 4 x 4 stock;
- One power hack saw to handle 8 x 8 stock;
- Eight 18-in x 3-in. Duplex grinders;
- Five 16-in. portable engine lathes, 36 in. between centers.

One of the largest orders placed for some time was closed last week by the Hurley Machine Co., Chicago. This company purchased 15 power presses of various sizes, involving a total investment of about \$20,000. One of the largest individual orders taken recently was a \$4,000 milling machine, bought by a general machine repair shop in this city. One machinery house reports selling the entire equipment for a small manufacturing shop which has been started in this city. The purchase included an engine lathe, shaper, milling machine, grinding machine, two upright drills, punch press, an arbor press and miscellaneous small equipment.

The G. A. Ball Bearing Co., Lake and Albany streets, Chicago, has let contract for a one-story plant, 124 x 163 ft., at 3305-21 West Harrison Street, to cost \$50,000.

C. Schroeder, 5007 North Winchester Avenue, Chicago, has let contract for a one-story machine shop, 50 x 125 ft., at 2633-35 Belmont Avenue, to cost \$10,000.

The Shakeproof Screw & Nut Lock Co., 404 Wrigley Building, Chicago, has been incorporated to manufacture shakeproof nut and screw lock washers. The product was designed to meet the need for a lock washer which will positively hold nuts and screws under excessive vibration. The company proposes to lease a plant for the present and will be in the market for 25 to 30 power presses. The officers include H. R. Hough, president; W. L. Stickney, vice-president; and R. T. Hosking, secretary.

The Progressive Mfg. Co., 2812 North Avenue, Chicago, has been incorporated with \$20,000 capital stock to manufacture a bench sheet metal shear and a combined center finder and center drill for machinists. It has leased a plant

at the address given and is fully equipped for the time being. The officers include Alfred K. Johnson, president; Gustav E. Schmidt, secretary; and Ernst Schmidt, treasurer.

W. Edwards & Co., Inc., has let contract for a one-story garage, 75 x 224 ft., 3731-39 Broadway, Chicago, to cost \$60,000.

The State Board of Control, Capitol, St. Paul, Minn., has taken bids on a three-story metallurgical laboratory on the State University campus, to cost \$225,000.

The Common Council, Shelbyville, Ill., will hold in abeyance the erection of its municipal electric power plant, estimated to cost about \$75,000, and will call for bids next spring. Fuller & Beard, Railway Exchange Building, St. Louis, are engineers.

A vocational training department will be installed in the new high school building to be erected by the Board of Education, Chadron, Iowa, estimated to cost \$180,000.

H. C. Christensen, architect, 7258 Union Avenue, Chicago, is taking bids for an ice-manufacturing plant, 125 x 250 ft., at Talman Avenue and Twelfth Street, estimated to cost in excess of \$250,000. The owner's name will be announced later.

The Commonwealth Edison Co., 72 West Adams Street, Chicago, has made application to the Public Service Commission for permission to issue stock to an amount of \$535,000, the proceeds to be used for general operations, extensions, etc.

The Keith Furnace Co., 326 South Eleventh Street, Des Moines, Iowa, will hold in abeyance the construction of its new plant at East Twenty-sixth Street and Dean Avenue, estimated to cost about \$250,000. Foundation work has been started and erection of the superstructures will begin early in March. Boyd & Moore, 314 Securities Building, are architects.

The Bergman & Henkens Co., Omaha, Neb., has awarded a contract to P. Kiewitz & Sons, Omaha National Bank Building, for a two-story foundry, 60 x 60 ft., at Eleventh and Grace streets, estimated to cost about \$42,000. Work will commence at once.

Philadelphia

PHILADELPHIA, Dec. 5.

The Philadelphia Electric Co., Main and Chestnut streets, Philadelphia, has disposed of a bond issue of \$12,500,000, the proceeds to be used for general operations, plant extensions and improvements, etc. Joseph B. McCall is president.

The Department of Public Works, Bureau of Highways, Philadelphia, has broken ground for a one-story machine shop, 61 x 150 ft., at Delaware and Fairmount avenues, estimated to cost close to \$30,000.

The machine shop and equipment of the James Carr Co., Philadelphia, has been acquired by the Rusfel Mfg. Co., of the same city, for increased manufacture of precision grinding lathes, tools, etc.

The Longacre Park Ice Co., Yeadon, Pa., care of S. L. Brumbaugh, 1427 Walnut Street, Philadelphia, is completing plans for a one-story automobile service and machine repair works at Yeadon, 32 x 164 ft., and 32 x 32 ft., respectively, for company trucks, estimated to cost about \$45,000. J. T. Hoekstra, 1713 Sansom Street, Philadelphia, is architect.

A vocational department will be installed in the three-story and basement high school, 180 x 180 ft., to be erected by the Board of Education, Atlantic City, N. J., and it is estimated to cost close to \$1,000,000, including equipment. John T. Rowland, Jr., 100 Slip Avenue, Jersey City, and H. A. Stout, Guarantee Trust Building, Atlantic City, are associated architects.

A one-story power house will be erected in connection with the three-story State normal school, 138 x 300 ft., by the State Board of Education, Trenton, N. J., on Mullican Hill Road, Glassboro, N. J. Guilbert & Betelle, 665 Broad Street, Newark, are architects.

The Chicago Bridge & Iron Works, Greenville, Pa., will devote a portion of its local plant to the manufacture of oil storage tanks for the Sinclair Crude Oil Purchasing Co., New York. The order covers 50 80,000-bbl. tanks.

A sale of the plant and property of the Lehigh Machine Co., Lehigh, Pa., will be held on Dec. 12.

A vocational department will be installed in the three-story junior high school, 230 x 340 ft., to be erected at New Castle, Pa., estimated to cost \$650,000. W. G. Eckles, Lawrence Savings & Trust Building, is architect.

The Board of Trustees, State Hospital for the Insane, Norristown, Pa., will receive bids until Dec. 13 for an electric truck and trailer. W. W. Hibbert, 415 Penfield Building, Philadelphia, is engineer. Oscar L. Schwartz is steward in charge.

The Spring City Glass Works, Spring City, Pa., will soon take bids for a one-story machine shop, 25 x 50 ft., estimated to cost about \$15,000. J. Vincent Poley, 162 Second Avenue, Roversford, Pa., is architect.

Fire, Nov. 30, destroyed the machine, forge and wood-working shops at the mines of the Centralia Lehigh Valley Coal Co., Mahanoy, Pa., with loss estimated at \$25,000. The plant will be rebuilt.

New England

BOSTON, Dec. 5.

The local machine-tool market, which in the latter part of November displayed little life, has revived somewhat. Actual and prospective business, however, is limited, and calls for deliveries at points usually north of Boston. In central Massachusetts, Rhode Island and Connecticut things appear at a standstill on the surface, but considerable quiet looking about is going on which it is felt will develop into something tangible early in the year. Sales by local dealers the past week, while limited, were of sufficient proportions to impart encouragement and the belief that December will be more profitable than anticipated.

Buying interest centers largely in lathes. Next to lathes, milling machines have the best call and there is some inquiry for shapers and one or two-spindle drills, but on the general run of machine-tools inquiries and sales are only occasionally reported. One large Massachusetts manufacturer is in the market for 10 12-in. x 5 ft. geared head lathes for immediate delivery and possibly will materially increase the number of machines bought. In this case it is reported the buyer will not consider more than three makes. A textile machinery maker has purchased a 3-ft. radial drill and is inquiring for a single-spindle five-hole turret full automatic screw and stud forming machine, while a Greenfield manufacturer is negotiating for four to six used milling machines, and a local dealer is looking for a universal milling machine, shaper and upright drill, all used equipment, for a prospective customer.

Flat drill sockets and taper sleeves have been reduced approximately 5 per cent. Critchley reamers are quoted about 10 per cent lower.

The Billings & Spencer Co., Hartford, has issued a new discount sheet which shows machine wrenches 10 per cent lower, adjustable wrenches 5 to 12 per cent, wrench sets 10 per cent, and dogs 10 per cent. Tool kits and tool makers' hammers, formerly quoted at 33½ per cent discount, are now 40 per cent.

Plans are being drawn for a two-story, 70 x 128 ft. sales and service station on Commonwealth Avenue, contemplated by Owen F. Farley, 27 State Street, Boston.

The Eastern Metal & Refining Co., Boston, has abandoned its projected one-story, 43 x 160 ft. manufacturing building at 30 Commercial Street.

Plans have been drawn for a one-story, 60 x 100 ft. plant on Connecticut Boulevard, East Hartford, Conn., for the Charter Oak Machine Co., 438 Asylum Street, Hartford.

The Market Forge Co., Garvey Street, Everett, Mass., will erect a two-story addition and make alterations in the original plant.

C. N. James, 139 Brookline Street, Cambridge, Mass., automobile wheels, has awarded contract for a one-story, 100 x 122 ft. addition.

Equipment is being installed in the Hartford fire department's new machine shop and general service station on John Street. Lathes, drill presses, milling machines and grinders are in operation.

The New York, New Haven & Hartford Railroad has completed plans for the erection of a coal pocket at New Haven, to cost approximately \$58,000. An electric hoist is included in the equipment wanted.

Work has been started by the Easthampton Foundry, Easthampton, Mass., on its new plant on Lake Street. During construction the company will have its castings made in Florence, Mass.

The Middletown Firearms & Specialty Co., Middletown, Conn., has transferred to Oscar B. Welker a building and land on Warwick Street, together with shafting, pulleys, etc., which will be used for manufacturing purposes.

The Cumberland County Power & Light Co., Portland, Me., is tentatively considering the construction of an auxiliary steam power plant on the east side of the Portland bridge. Plans call for the installation of two 5000-kw. steam turbine generator units.

An automobile service and repair building, 60 x 88 ft., will be constructed at 23-25 Fitchburg Street, Somerville, Mass., by the Great Atlantic & Pacific Tea Co., 150 Bay Street, Jersey City, N. J.

The Malden Electric Co., Malden, Mass., has awarded contract to the Hudson Construction Co., 6 Beacon Street, Boston, for a one-story power house, 63 x 66 ft., at Everett, Mass., estimated to cost about \$65,000.

The Shawmut Machine Works, Inc., 81-83 Elmwood Street, Boston, has filed plans for a one-story machine shop, estimated to cost about \$20,000.

The Farmington River Power Co., Windsor, Conn., is having plans prepared for the erection of a new hydroelectric power plant, with initial capacity of about 12,000 hp. I. W. Jones, Milton, N. H., is engineer.

The Windham Mfg. Co., South Windham, Me., is completing plans for the construction of a hydroelectric power plant. Arthur P. Safford, 66 Broadway, Lowell, Mass., is engineer.

A one-story automobile service and repair building, 63 x 95 ft., for company trucks will be built by the General Baking Co., Roxbury, Mass. The Scully Co., East Cambridge, Mass., has the contract.

Pittsburgh

PITTSBURGH, Dec. 5.

There have been fewer inquiries and sales of machine tools and equipment the past week, but this is regarded as merely a seasonal development, due to the close of the year and the wish of prospective buyers to avoid spending money, with inventory taking immediately at hand. Prospective business is good and the belief still prevails that the new year will bring some orders.

The only crane business lately placed was a 15-ton, 40-ft. span overhead for the Wheeling Mold & Foundry Co., Wheeling, W. Va., which went to the Champion Engineering Co., Kenton, Ohio. This crane is for installation at the old plant of the Wheeling Steel Castings Co., Warwood, W. Va., purchased early in the year by the Wheeling Mold & Foundry Co., and which is being enlarged for making chilled iron rolls. Four crane companies are figuring on a 75-ton crane, but the identity of the prospective buyer is kept secret. There are a number of similar instances where buyers have sent out their inquiries to a selected list of manufacturers most likely to provide the kind of crane wanted, but the question naturally arises as to whether the lowest possible price can be obtained when the number of bidders is limited. Apparently, buyers do not suffer from this practice, because they always have recourse to submitting inquiries elsewhere if the original bidders do not make a satisfactory price. Nothing yet has developed in connection with cranes inquired for by the Standard Underground Cable Co., Pittsburgh, and the Sanderson Cyclone Blower Co., Orrville, Ohio, which have been looked upon as likely to be closed at an early date.

Max Solomon, Pittsburgh, scrap iron and steel, is laying out a storage yard at Wheatland, just outside Sharon, Pa., and is inquiring for two 25-ton yard cranes.

The National Tube Co., Pittsburgh, is in the market for two jib cranes, 5 and 7½ tons respectively. The Mackintosh-Hemphill Co., 1227 Liberty Avenue, will install a 5-ton crane at its plant.

Some steel mill equipment is being bought and some good business is pending. The Jones & Laughlin Steel Co. recently placed with the General Electric Co., through its Pittsburgh office, a direct connected motor for driving a Morgan continuous mill at its Alliquippa works. It is expected that the Wheeling Steel Corporation soon will close for a uniflow engine for driving a 19-in. continuous mill and for a reversing twin tandem engine for driving a 35-in. blooming mill, both for installation at the Steubenville, Ohio, works. The Worthington Pump & Machinery Corporation is low bidder for a 2,000,000-gal. pumping engine for the waterworks of the Borough of Tarentum, Pa. Another waterworks project attracting interest is that of the city of Cleveland. Bids were opened Dec. 1 for eight turbine driven centrifugal waterworks pumps.

The National Fireproofing Co., Fulton Building, Pittsburgh, will rebuild by day labor its plant at East Palestine, Ohio, partially destroyed by fire. The main building will be one-story, 200 x 200 ft., and is estimated to cost about \$50,000.

The United States Lock Nut Corporation, 400 Michigan Avenue, Chicago, has tentative plans under way for a new factory at Pittsburgh, estimated to cost \$500,000.

The Proctor Coal Co., Huntington, W. Va., is planning the construction of a new tiple in the vicinity of Amherstdale and the installation of considerable electrical and other mining machinery, estimated to cost \$200,000. A. J. Dalton is president.

The Community Power Co., Petersburg, W. Va., has made application for permission to construct a dam and

hydroelectric power plant across the South Branch of the Potomac River, near Petersburg. A. J. Welton represents the company.

The Steel City Automobile Co., Pittsburgh, local representative for the Peerless automobile, has leased the five-story building, 60 x 137½ ft., at 3968-70 Forbes Street, to include service and repair departments.

A vocational department will be installed in the new high school to be erected by the Board of Education, McKeesport, Pa., estimated to cost about \$300,000.

The Tyler Pipe & Tube Co., Washington, Pa., has completed plans for the erection of a one-story power house and producer plant, 25 x 50 ft., and 50 x 50 ft., estimated to cost \$50,000, including machinery. The Simplex Engineering Co., Washington Trust Building, is engineer.

Milwaukee

MILWAUKEE, Dec. 5.

The gradual enlargement of operations by foundries and machine shops, due to improvement in orders, has imparted unusual interest to the trade, especially as activity ordinarily declines as the year comes to a close. While buying has been only slightly affected by the increased operations prospects appear considerably improved and manufacturers and dealers look for one of the best months of the year in December, with a new year outlook much improved in comparison with last year. Major industries are establishing gains in unfilled orders.

By Dec. 1 the value of building permits issued by the city of Milwaukee had exceeded those issued in the entire year of 1919, which marked the previous high record. So far this year the aggregate value of permits is \$23,403,205, while for all of 1919 it was \$23,366,077.

The village of Eagle River, Wis., adopted a bond issue of \$20,000 for the purchase of additional generating equipment for installation in the municipal hydroelectric generating plant. An engineer will be selected at once.

The American Hide & Leather Co., 1320 Elston Street, Chicago, is taking bids at Milwaukee through Lockwood, Greene & Co., consulting engineers, 38 South Dearborn Street, Chicago, for the erection and equipment of a new plant estimated to cost \$500,000. It will replace the Milwaukee tannery at 658 Commerce Street, destroyed by fire early in September. The main building will be 260 x 315 ft., three stories and basement. The project involves replacement of virtually all tanning machinery, power plant equipment, coal and ash handling machinery, boilers, etc. G. A. Riker is local manager at Milwaukee.

The Milwaukee County Board of Supervisors, W. J. Cary, county clerk, has engaged Vaughn & Meyer, consulting engineers, 209 Grand Avenue, Milwaukee, to prepare plans and specifications for a central light, heat and power plant for the group of county institutions at Wauwatosa. The cost is estimated at \$250,000 with equipment. W. L. Coffey is manager of county institutions.

The Wisconsin Wagon Co., 115 South Carroll Street, Madison, Wis., has let the general contract to A. D. & J. O. Frederickson Co., local for a three-story factory, 50 x 132 ft., to replace the one destroyed by fire recently. It will cost about \$50,000, including equipment.

The Maxon Co., Milwaukee, has been incorporated with a capital stock of \$75,000 to manufacture machinery, tools, mechanical appliances, etc. The incorporators are Glenway Maxon, Jr., 366 Kane Place, George F. Luecking, 729 Fourth Street, and Glenway Maxon, Sr., 27 Mack Block, Milwaukee. It intends to lease space and engage in the production of patented tools designed by Glenway Maxon, Jr. Further details will be issued later.

F. C. Seeger, Milwaukee, is equipping a small shop at 660-662 Third Street, for the production of sheet metal work.

The E. L. M. Tire Co., Racine, Wis., has plans for a new tire and rubber goods factory, 150 x 160 ft., two stories and part basement, estimated to cost \$100,000. Work probably will not begin until April 1. O. W. Dunham is secretary.

The Consolidated Water Power & Paper Co., Wisconsin Rapids, Wis., is inquiring for a bucket elevator conveyor system, blower fan heating system, water screens and other special equipment for a \$125,000 addition to its plant at Biron, Wis., now under construction. L. A. DeGuere, local, is architect and consulting engineer.

The Milwaukee Parts Corporation, Wauwatosa, Wis., has been organized with a capital stock of \$50,000 to manufacture, axles, tools, machinery and mechanical appliances. It takes over the business of the Wisconsin Gear & Axle Co., which has conducted a machine shop at State Street and Hawley Road. The incorporators are John L. Michalski, 677 Grove Street, Louis Scheible, 475 Nineteenth Street,

Milwaukee, and Alfred J. Tank, secretary Wisconsin Gear & Axle Co., Wauwatosa.

The Federal Safety Mfg. Co., Milwaukee, has been incorporated with a capital stock of \$5,000 to manufacture burglar alarm systems, home protection devices, etc. The incorporators are Henry Steurnagel, E. C. Kambe, 425 East Water Street, and John E. Lee, 103 Twenty-eighth Street. It is intended to establish a small shop for experimental purposes and to effect a small production of proved devices.

Detroit

DETROIT, Dec. 5.

Machine tool inquiries in this district have shown some improvement the past week, and dealers report a considerable number of sales of single tools for delivery early next year.

The Detroit Marine Aero Engine Co. has been organized and will have its headquarters in Highland Park. Among those interested are A. A. Schantz, president Detroit & Cleveland Navigation Co.; Gar Wood and J. Lee Barrett, of the Wood Hydraulic Hoist & Body Co.; O. F. Barthel and Fred R. Hill, all of Detroit, and Carl G. Fisher and James A. Allison, Indianapolis.

It is reported that Frank W. Ruggles, president Ruggles Motor Truck Co., Saginaw and Bad Axe, Mich., will take over the plant of the defunct Bollstrom Motors, Inc., St. Louis, Mich., and operate it in conjunction with the wheel plant of the Ruggles company in Alma, Mich.

The Michigan Hardware Co., Grand Rapids, Mich., has awarded contract for its three-story addition to cost \$35,000. The present building is 100 x 100 ft.

The Reed Foundry & Machine Co., Kalamazoo, Mich., has awarded contract to Miller & Boyer for a machine shop 100 x 120 ft., one story. It will be of saw tooth type and consist of four units, each 30 x 100 ft. Work will be rushed on the initial units, which are expected to be ready for occupancy by Feb. 1. Contracts for equipment are being placed.

The Outagamie Limestone Co., 75 Thirtieth Street, Milwaukee, is having plans prepared for a new plant at Black Creek, Mich., the equipment to include quarrying, crushing and other machinery, estimated to cost close to \$200,000. H. O. Welden, 10 South La Salle Street, Chicago, is engineer.

A vocational training department will be installed in a two-story central high school to be erected by the Board of Education, Flint, Mich., at a cost of \$1,250,000. Bids will be taken at once. Malcolmson, Higginbotham & Palmer, Moffat Building, Detroit, are architects and McColl, Snyder & McLean, 2348 Penobscot Building, Detroit, engineers.

The Standard Auto Co., 648 Bridge Street, N. W., Grand Rapids, Mich., has awarded contract to F. Burgstahler & Son, 527 Fremont Street, N. W., for a two-story service and repair building, 102 x 130 ft., at Bridge and Gold streets, N. W., to cost about \$30,000.

The Board of Water & Electric Light Commissioners, Lansing, Mich., will receive bids until Dec. 15 for the construction and equipment of a new municipal electric power plant. The installation will include a locomotive crane, bridge crane, coal and ash-handling machinery, steam turbo-generator and auxiliary electric machinery, condensers, feed-water equipment, etc. J. E. Woodwell, 501 Townsend Street, Lansing, is consulting engineer. O. E. Bulkeley is superintendent.

The Otsego Angle Steel Co., Plainwell, Mich., has construction under way on a one-story plant, 45 x 200 ft.

Indiana

INDIANAPOLIS, Dec. 5.

Sales of machine tools show little improvement the past week. The Link-Belt Co. recently purchased a 42-in. vertical boring mill for its Indianapolis plant, and the Interstate Car Co., which has been inquiring for a vertical boring mill, 5-ft. radial drill and a No. 3 universal milling machine, has withdrawn its inquiry.

Used machine tools continue to find favor, and a number of cases are noted where inquiries for new tools have been withdrawn after the buyer became aware of the great difference in price. Used drill presses and cylinder grinders are most in demand.

The Butler Mfg. Co., 3234 West Washington Street, Indianapolis, is inquiring for a machine to turn the relief of automobile piston bosses.

The Central Machine Works, Indianapolis, Ind., is looking for a used horizontal boring, drilling and milling machine with a 3 to 4-in. bar vertical adjustment to the spindle and cross feed to the work table.

The Speedway Engineering Co., 910 North Illinois Street, Indianapolis, has an inquiry out for a used No. 2 universal milling machine.

The American Machinery Corporation, 334 North Capitol Avenue, Indianapolis, is inquiring for a used Fischer oil groover and a new automatic brass rod polishing machine to polish brass tubes 30 in. long and 1½ in. in diameter.

The Victor Bearings Co., 202 South Pennsylvania Street, Indianapolis, manufacturer of ball bearings, etc., will erect a one and two-story plant, 120 x 151 ft., estimated to cost about \$50,000. W. L. Sandage is president.

The Haskell & Barker Car Co., Michigan City, Ind., is taking bids for a one-story addition to its foundry and power plant, estimated to cost close to \$500,000, including machinery. Frank D. Chase, Inc., 545 North Michigan Avenue, Chicago, is architect and engineer.

A one-story power house will be erected by the Storms Novelty Works, Winchester, Ind., in connection with its two-story plant, 50 x 100 ft., now in course of erection.

The Indiana Hydro-Electric Power Co., Indianapolis, has been granted permission to issue bonds for \$1,250,000 and stock for \$4,500,000, the proceeds to be used for general operations and the construction of hydroelectric generating plants on the Tippecanoe River. The company was recently organized. Plans are being prepared by John A. Shafer, engineer, Indianapolis. Harry Reid, president Interstate Public Service Co., Indianapolis, is vice-president and general manager.

The Marion Foundry Corporation, Marion, Ind., has established headquarters at Auburn, Ind., and in the future will operate at the latter place.

J. W. Johnson, Kokomo, Ind., and associates have purchased the plant of the Liberty Pressed Metal Co., Kokomo, at a receiver's sale. The new owners are planning to operate the works.

Ohio

Some Cleveland dealers state that their aggregate sales during November were a little better than in October, but with others business fell off. As a whole it is probable that November was no better or worse than the previous month. Single tool inquiries held up fairly well, but the placing of much prospective business will probably be deferred until after the first of the year. The only railroad inquiry is from the Big Four for a 300-ton car wheel press for its Linndale shops.

Used machinery in large quantities is still coming on the market. The General Motors Corporation is collecting used tools from its various units at the old plant of the Northway Motor & Mfg. Co. in Detroit, which it will place on the market through dealers. It is reported that this equipment will amount to from 1500 to 1600 machines, much of it being in very good condition. The Standard Parts Co. is placing on the market the equipment of one of its units, the American Ball Bearing plant in Cleveland, which will aggregate from 50 to 100 machines.

In Cincinnati the past week was most encouraging in the machine-tool field, as a number of orders were booked by local manufacturers and inquiries were received from sources which have been inactive for some time. While most of the orders are for single machines, on many inquiries tools built locally are specified, and it is expected that contracts will be placed here. Part of the Virginian Railroad order recently placed was booked with local manufacturers and the probabilities are that this road will shortly issue two more lists for other shops, about 20 tools in all. The Chesapeake & Ohio Railroad is reported to have placed orders for eight lathes with an Eastern manufacturer. This road closed bids on another list Nov. 28, calling for about 20 machines, including eight lathes, five punches and shears and other equipment. It is expected this business will be placed shortly. On the Santa Fe list buying is looked for within a week or two, and other roads now preparing lists of 1922 requirements will probably issue them shortly after the new year. Recent developments in the Southwestern oil fields are expected to furnish some business for machine-tool manufacturers. Local dealers report increased inquiry in both new and used tools and look for orders to develop shortly after the new year.

The Butter Cutter Mfg. Co., Cleveland, was organized recently and is establishing a plant at 5902 Carnegie Avenue to manufacture machines for cutting butter, used largely in hotels. It expects to buy several machine tools.

The Hearing Tool Co., Zanesville, Ohio, has been incorporated with a capital stock of \$25,000 to manufacture garage tools and locking and steering wheels. For the present the product will be manufactured in Columbus. S. D. Hearing is president and H. W. Unkel, vice-president.

The Bock Bearing Co., Toledo, has sold its Grand Avenue

plant to Herbert W. Bigelow and will consolidate its activities at its main plant in West Toledo.

The Baltic Bending Co., Sugar Creek, Ohio, has acquired a new site on which it will erect a plant to take the place of one recently burned.

The Sands Mfg. Co., 5407 Sweeney Avenue, Cleveland, maker of water heaters, etc., plans the erection of a forge shop 35 x 100 ft.

The Willys-Overland Co., Toledo, Ohio, will move its Willys-Knight motor assembling plant from Elyria, Ohio, to Pontiac, Mich., where production will be concentrated, owing to the fact that motor castings are being made at the plant of the Wilson Foundry & Machine Co. in Pontiac. The Elyria plant will be used for other purposes.

The E. W. Bliss Mfg. Co., St. Clair Avenue, Cleveland, manufacturer of presses and other machinery, is planning for the erection of a one-story forge shop, estimated to cost about \$42,000.

A vocational department will be installed in the two- and three-story high school, 115 x 170 ft., now being erected by the Board of Education, Alliance, Ohio, estimated to cost about \$400,000.

The plant of the Marion Die, Tool & Machine Co., Marion, Ohio, is being moved to Mount Vernon, Ohio, where it will be consolidated with the C. & G. Cooper Co.

The Gulf States

BIRMINGHAM, Dec. 5.

The Common Council, Vernon, Tex., is perfecting plans for a municipal electric light plant to cost about \$65,000. An ice-manufacturing plant is also being considered. A bond issue of \$100,000 is being arranged.

The Decatur Ice & Cold Storage Co., Decatur, Ala., is completing plans for an ice and cold storage plant, 34 x 55 ft. T. J. Jones is manager.

Following the acquisition of the plant and equipment of the Talladega Foundry & Machine Co., Talladega, Ala., by Morris W. Bush and associates, Birmingham, the new owners are said to be planning the organization of a company under the name of the Talladega Pipe Co., capitalized at \$100,000, to operate the plant. A section of the works has been placed in service and it is proposed to begin production in other departments at an early date.

In connection with the establishment of a gravel plant the Thomas Gravel Co., Alexandria, La., will install two steam shovels, two industrial locomotives, dump cars and other miscellaneous equipment. The company was incorporated recently with a capital of \$140,000. I. L. Thomas is general manager and R. C. Baker, treasurer and secretary.

The Magnolia Petroleum Co., Dallas, Tex., has acquired about 165 acres at Mexia, Tex., for the establishment of an oil tank farm.

Ira P. De Loach, Dallas, Tex., has filed plans for a three-story automobile service and repair building at 2113-23 Main Street, estimated to cost \$102,000.

The Uvalde Rock Asphalt Co., 1113 Central Trust Building, San Antonio, Tex., will build a one-story machine shop and automobile service works, 50 x 100 ft. J. B. Smythe is president.

A vocational department will be installed in the new high school to be erected by the Board of Education, Amarillo, Tex., bonds for which in the amount of \$220,000 recently have been voted. Plans will be prepared soon.

The Chamber of Commerce, Rockdale, Tex., is organizing a company to establish a plant for the manufacture of water filters and kindred products. Patents held by Jones & Moore, Rockdale, who will be interested in the new company, will be taken over. It will be capitalized at \$50,000.

Adam J. Walz, Fort Mason, Tex., is organizing a company to establish a plant for the manufacture of bricks, etc. A pressed brick department will be installed.

Nelson & Wofford, Gadsden, Ala., have completed plans for a one-story machine shop and automobile repair works, 40 x 125 ft.

The Board of City Commissioners, Mobile, Ala., has preliminary plans under consideration for a municipal electric light and power plant.

The Dallas Co-Operative Ice & Mfg. Co., Dallas, Tex., has plans under way for an ice-manufacturing plant to cost about \$75,000.

The action for a receivership for the Southern Motors Mfg. Co., Houston, Tex., has been dismissed. The company will resume operations and plans an extensive production schedule.

The Houston Power Co., Dothan, Ala., has plans under

way for the construction of a hydroelectric generating plant on the Choctawhatchee River, Dale County. The initial installation will be about 2000-hp.

A vocational department will be installed in the three-story high school to be erected at Uniontown, Ala. Frank Lockwood, Montgomery, Ala., architect, will prepare plans and specifications.

Buffalo

BUFFALO, Dec. 6.

The Carbo-Oxygen Co., Pittsburgh, has construction under way on new works at Buffalo to manufacture commercial oxygen and hydrogen and will enlarge its plants at Bayonne, N. J., Coraopolis, Pa., Cleveland and Columbus, Ohio, establishing a complete oxygen works at each location. To carry out the project, the company has arranged for a preferred stock issue of \$2,000,000. J. C. Trees is president and J. R. Rose, vice-president.

The Syracuse Lighting Co., Syracuse, N. Y., has disposed of a preferred stock issue totaling \$500,000, the proceeds to be used for general operations, extensions, etc.

In connection with a project for the construction of an electric railroad from Buffalo to Wellsville, headed by C. A. Finnegan, 339 Washington Street, Buffalo, owner of the Buffalo & Wellsville Railroad, new rails and splices are estimated to cost \$300,000; electric lines and poles, \$200,000; electric booster stations, \$60,000, and equipment, \$125,000. The right of way will comprise the abandoned roadbed of the Buffalo & Wellsville road. A company will be organized and bonds for \$1,000,000 issued.

A one-story cold storage plant will be constructed by the New York State College of Agriculture, Cornell University, Ithaca, N. Y. Lewis F. Pilcher, Capitol Building, Albany, N. Y., State architect, has completed plans.

The Adams Basin Electric Light & Power Co., Ogden, N. Y., has made application to construct a local electric power plant.

An automobile service and repair building will be constructed by the National Biscuit Co. in connection with its two- and five-story plant at Buffalo, contract for which has been awarded to the Thompson-Starrett Co., 49 Wall Street, New York. The entire plant will cost \$1,600,000, including equipment.

A vocational training department will be established in connection with the two-story and basement, high and grade school, 125 x 136 ft., now being erected by the Board of Education, Little Valley, N. Y., estimated to cost about \$200,000. Daniel G. McNeill, 80 West Genesee Street, Buffalo, is associate architect for the project.

Baltimore

BALTIMORE, Dec. 5.

The Curran Motor Radiator Co., 401 Calvert Building, Baltimore, will soon take bids for its one-story plant, 40 x 130 ft., estimated to cost about \$30,000.

The Baltimore & Ohio Railroad, Baltimore and Charles streets, Baltimore, has commenced the erection of a one-story ice manufacturing plant at Evitt's Creek, Cumberland, Md., estimated to cost \$150,000, including machinery. H. A. Lane is chief engineer.

The Board of Police Commissioners, Baltimore, is completing plans for a one-story automobile service and repair building to cost \$30,000. O. Eugene Adams, Calvert Building, is architect.

The S. B. Sexton Stove & Mfg. Co., 501 West Conway Street, Baltimore, has commenced operations at the former plant of the Isaac A. Sheppard Co., Excelsior Stove Works, Chester and Eastern avenues, recently acquired at a receiver's sale. It will also continue its present works.

The Canton Co., Commerce and Water streets, Baltimore, will build a one-story power house, 40 x 70 ft., at Third and Sixteenth streets.

Fire, Dec. 1, destroyed a portion of the plant of the Parker Metal Decorating Co., North Avenue and Gay Street, Baltimore, with loss estimated at \$100,000, including equipment.

A vocational department will be installed in the high school to be erected at Clifton Park by the Board of Education, Baltimore, estimated to cost about \$500,000. Preliminary plans are being drawn and bids will be asked early in the new year. Dr. Henry S. West is superintendent.

The Bureau of Yards and Docks, Navy Department, Washington, will install new equipment at its power house at Bellevue, D. C., under specification No. 4497.

The Town Council, Springfield, Ga., is having plans prepared for the installation of a municipal electric lighting plant.

The Agricultural and Technical College for Negroes, Greensboro, N. C., will build an automobile mechanics building, with machine shop and other departments, and agricultural experiment building, estimated to cost \$100,000. M. C. S. Noble is chairman of the building commission. Harry Barton, Greensboro, is architect.

A one-story power house will be constructed by the Board of Education, Winston-Salem, N. C., in connection with the new four-story Reynolds academic arts school building, 160 x 250 ft. R. H. Latham is superintendent of public instruction.

The Skaggs Brothers Electric Co., Hillsville, Va., will build a new hydroelectric generating plant on Little Reed Island Creek, for commercial light and power service.

A vocational department will be installed in the new two-story and basement Yorkville high school, 81 x 168 ft., to be constructed by the Board of Education, York, S. C., and to cost about \$125,000. Edward & Sayward, Atlanta, Ga., are architects.

The Central South

ST. LOUIS, Dec. 5.

The Kansas City Light & Power Co., Fifteenth Street and Grand Avenue, Kansas City, Mo., has commenced excavations for a one-story and basement power house, 50 x 140 ft., at 1110-12 Baltimore Avenue.

The Decker Machine & Tool Co., Okemah, Okla., recently organized with a capital of \$75,000, is arranging for the establishment of a plant, to include a machine repair department for oil-well and other equipment. A branch works at Henryetta, Okla., is also being considered. Harry C. Decker and R. C. Johnson head the company.

The Dewey Portland Cement Co., Mutual Building, Kansas City, Mo., has awarded a contract to the MacDonald Engineering Co., 53 West Jackson Boulevard, Chicago, for an addition to its plant at Dewey, Okla., to cost about \$60,000.

The Southern Electric Mfg. Co., P. O. Box 435, Bristol, Tenn., has leased a local building for the manufacture of electric fuses, plugs, cut-outs and kindred specialties. The machinery installation will include punch presses, sensitive drill presses, bench tools, etc. William M. Nelson is general manager.

The Board of Education, Memphis, Tenn., has awarded contract to R. S. Wilkes, 80 North Main Street, for the erection of a one-story mechanical shop addition at the Crockett Technical High School.

The Common Council, Columbia, Mo., is planning for enlargements and improvements in its municipal electric lighting plant, to cost about \$40,000. Additional equipment will be installed.

The Coline Oil Co., Ardmore, Okla., has acquired about 40 acres, near Ardmore, for the establishment of a tank farm, the initial installation to comprise 25 steel storage tanks, each of about 55,000 bbl. capacity.

A one-story ice and cold storage plant, estimated to cost close to \$45,000, will be constructed by the Goodner-Mitchell Produce Co., Tulsa, Okla. It will be 95 x 100 ft.

S. T. Odell, Johnson City, Tenn., will break ground at once for a one-story and basement wagon and carriage shop, 42 x 162 ft., to cost about \$25,000. Mitchel & Gradig, 108 Spring Street, are architects.

The Gray Knox Marble Mills, Knoxville, Tenn., are planning for enlargement and improvements, with the installation of new finishing and other machinery, estimated to cost about \$200,000.

A vocational training department will be installed in the three-story and basement junior high school, 100 x 134 ft., to be erected by the Board of Education, Topeka, Kan., estimated to cost about \$150,000.

The Mountain Grove Creamery, Ice & Electric Co., Gainesville, Mo., is planning for the construction of a hydroelectric generating plant on the North Fork River to furnish electric service at Gainesville and vicinity.

W. J. Barnhill & Son, Madisonville, Ky., have preliminary plans under way for a two-story machine and automobile repair works, 65 x 165 ft. J. T. Waller, Hopkinsville, Ky., is architect.

The Appalachian Marble Co., Knoxville, Tenn., is arranging an appropriation of about \$35,000 for the purchase of additional machinery. A new one-story building will be erected. T. J. Deane is president.

A one-story cold storage plant, 92 x 100 ft., estimated to cost \$40,000, will be constructed by the Bazzell-Wright Co., Muskogee, Okla. H. O. Valeur & Co., Phoenix Building, are architects.

California

LOS ANGELES, Nov. 29.

The City Engineering Department, Los Angeles, is preparing plans for a one-story machine shop, 75 x 128 ft., estimated to cost \$12,000, exclusive of equipment.

The Red Seal Refining Co., Long Beach, Cal., has acquired property on West Anaheim Street for the erection of a plant, estimated to cost in excess of \$600,000, including machinery. H. L. Hagerman is treasurer.

The Kittle Mfg. Co., 643 Santa Fe Avenue, Los Angeles, has construction under way on a one-story plant, 140 x 160 ft., to manufacture sheet metal products, enameled goods, etc., estimated to cost about \$65,000, including machinery.

The California Car Co., Richmond, Cal., is completing negotiations with the city officials at Martinez, Cal., for a plant to manufacture automobiles and parts, estimated to cost close to \$100,000. It will give employment to about 250. A. D. Bowen is president.

The Central Garage, Santa Ana, Cal., will build a one-story machine repair and service building, 50 x 120 ft., on West Third Street. B. W. McClure is head.

A vocational department will be installed in the new high school to be erected by the Board of Education, Pomona, Cal., estimated to cost about \$425,000. Bids will be asked soon.

The Willard Storage Battery Co., San Francisco, is having plans drawn for a two-story building at Second and Stillman streets estimated to cost about \$40,000. O'Brien Brothers, 240 Montgomery Street, are architects.

The Hutchinson Lumber Co., Oroville, Cal., has increased its capital from \$2,000,000 to \$3,000,000, a portion of the proceeds to be used for the completion and purchase of equipment in its box manufacturing plant, saw mill and veneer factory, now in course of erection.

The Cinemaphone Co., Los Angeles, recently organized with a capital of \$1,000,000 to manufacture electrical specialties, has commissioned the Austin Co., Los Angeles, to prepare plans for a factory, comprising machine shop, general manufacturing building, electrical laboratory, etc. George J. Webster is president.

Canada

TORONTO, Dec. 5.

Inquiries for machine tools are being received in goodly numbers, many of which will shortly turn into sales. While big lists are still absent orders calling for one or two tools are fairly numerous. On the whole the market is making progress, but dealers do not expect business to reach a normal stage until well into next year. Canadian Railroads have been ordering steel rails, but up to the present there has been but little equipment buying. Small tools are in fair demand for spot delivery, but future buying is out of the question at present.

The Metal Stampings Co., 111 Adelaide Street West, Toronto, Ont., is in the market for the following equipment for immediate delivery: Three spinning lathes, 28-in. swing, 6-ft. bed; three buffing spindles; two foot presses with deep throat for riveting; one automatic riveting machine with deep throat; 25 to 30-hp. motor, alternating current, 550 volts; rotary shear and one double action Toggle press, 12 to 16 in. stroke 30 in. between uprights.

The Ontario Hydro Electric Commission, University Avenue, Toronto, Ont., will build a hydroelectric system for Yarmouth Township, N. S., at a cost of \$115,000.

The London & Port Stanley Railway, London, Ont., is having plans prepared for the installation of additional power units, enlarging terminals, and construction of additional sidings, to cost about \$100,000.

The Bishopric Lamp Co., Cincinnati, Ohio, will erect a sulphate plant near Dunkirk, Ont., and has awarded contracts. The project includes power plant, equipped with steam engines, boilers and generators and will cost \$100,000.

The Chandler Machinery Co., Chandler, Que., is building an addition to cost \$8,000.

R. Patterson, 770 Third Avenue East, Owen Sound, Ont., is interested in a company which proposes to erect a cement manufacturing plant, of four units, with a daily capacity of 4000 bbl.

William R. Whiteway, architect, 1406 Dominion Building, Vancouver, B. C., is preparing plans for trunk and bag factory to cost \$30,000.

The Frost Steel & Wire Co., Ltd., Hamilton, Ont., is asking for a 15,000 lb. Olsen wire testing machine, motor driven, with autographic register.

The Beaver Truck Corporation, Hamilton, Ont., has taken over the plant and business of the Beaver Motor Truck Co., and extensive developments are planned. It proposes to produce a new model truck of 1½ tons.

The Weeks Engineering Corporation, a United States organization, has decided to establish a plant at Welland, Ont. It is taking over the works of the Welland Machine & Foundries and will install machinery for the manufacture of boiler plates, etc. Additional buildings will be erected next spring on the site, which comprises about 4 acres.

Seattle

SEATTLE, Nov. 29.

The Minnaugh Lumber Co., Wallowa, Ore., has applied for permission to construct a hydroelectric generating plant on the Wallowa River for general mill service.

The Mack International Motor Corporation, Seattle, has awarded a contract to the Great Northern Construction Co., New York Building, for a one-story service and repair building, estimated to cost about \$100,000.

A vocational department will be installed in the new high school building to be erected by the Board of Education, Kelso, Wash. Plans are under way.

Loading, unloading and conveying equipment, etc., will be installed at the dock of the Inman-Poulsen Lumber Co., Portland, Ore. Plans have been drawn for an extension to the present dock for a structure 45 ft. wide and 450 ft. long, and for the construction of a new dock in the same section, 35 x 300 ft.

The City Council, Seattle, is considering extensions and improvements in the municipal power plant and system during the next 24 months, to cost \$1,500,000.

The Chehalis Box, Basket & Veneer Co., Chehalis, Wash., has completed plans and will immediately rebuild its plant, recently destroyed by fire with an estimated loss of \$50,000, including machinery. L. J. Sticklin is president.

O'Brien Machinery Co. Improvements

The O'Brien Machinery Co. now occupies new offices and show rooms at 113 North Third Street, Philadelphia, Pa. The company was formerly located at 119 North Third Street. Its new home is in a five-story building which was recently purchased for its exclusive use. Extensive improvements have been made in the building. The entire five floors have been well shored and braced, so that each can be used for the display or repair of equipment. The new and increased space afforded by the building enables the company to departmentalize its business, electric motors, dynamos and generators being shown on one floor, small and moderate-sized machine tools on another, heavy tools on another, etc. One floor is devoted to the repair, re-winding, baking and testing of electrical equipment. On the ground floor heavy racks have been erected for the display of motors, etc. A fully equipped machine shop for repairs is a feature.

An elevator has been installed and on each floor is a two-ton chain hoist on trolley and I-beam to facilitate the handling of machinery. Modern conveniences of every kind have been installed, and throughout the building the company has followed out the idea of having plenty of light. Each floor is painted white, trimmed with gray, making the building an attractive one in which to work and receive visitors.

The company has offices double the size of the old offices, these being newly equipped. It will carry a larger stock than in the past in view of its increased facilities. It will retain its warehouses where surplus stock is stored.

The O'Brien Machinery Co. was formed six years ago by two brothers, Frank L. O'Brien and Clarence J. O'Brien, both of whom were well versed in the buying and selling of new and used power and machine shop equipment. Both are active in the conduct of the business. They believe that the heavy expenditure, during a dull period, involved in remodeling a building from top to bottom for their uses will be justified by a large volume of business in the near future. The new establishment is open to inspection. Both new and used equipment are shown.

Directors of the Wheeling Steel Corporation at a meeting Nov. 30 reduced the dividends of the preferred A. and B. stocks. The former was cut from an annual rate of 8 to 4 per cent and the latter from 10 to 5 per cent. The action was deemed necessary, officials said, in order to conserve the company's resources, as a result of the business depression which has made the steel business unprofitable for the past several months. The common stock dividend again was passed. The preferred dividends are payable Jan. 2.

IRON AND INDUSTRIAL STOCKS

Buying Power Outweighs Selling and Tendency of Prices Is Still Upward

As is usual at this time of the year, evidences of profit-taking are noted in the market for iron and industrial stocks. Such selling, however, is outweighed by buying with money not needed in the ordinary business operations, and the trend of security values, generally, is still upward. Special strength is shown of late in such issues as General Electric, American Car & Foundry, and Worthington Pump, denoting investment confidence in a wider variety of industries. The market for steel shares is irregular, with the underlying strength of United States Steel common the outstanding feature. That corporation's 5 per cent sinking fund bonds recently sold at par, for the first time in a number of years. Recent buying of copper stocks is reflected in November sales, amounting to 160,000,000 to 170,000,000 lb., a new high monthly record for 1921. Quiet investment buying of the rails and more vigorous of certain equipment securities, resulting in firmer prices, evidently is based on the promulgation by the Railroad Labor Board of 148 new working rules to supplant the national agreements with the railroad shop crafts.

The range of prices on active iron and industrial stocks from Monday of last week to Monday of this week was as follows:

Allis-Chalm. com.	36½-38½	Lackawanna Steel.	41½-48½
Allis-Chalm. pf.	85-86	Midvale Steel....	24½-30½
Am. Can com....	31½-33½	Nat.-Acme	12½-13½
Am. Can pf.....	89½-92½	Nat. E. & S. com.	41½-43
Am. C. & F. com.	142-151½	N. Y. Air Brake..	60-61½
Am. C. & F. pf....	—115	Nova Scotia Steel.	25-27
Am. Loco. com....	93½-98½	Press. Steel com.	64½-68½
Am. Loco. pf.....	—110½	Press. Steel pf....	89-91½
Am. Radiator com.	87-91	Ry. Stl. Spg. com.	88½-94½
Am. Steel F. com.	31½-35	Replieg Steel....	22½-24½
Am. Steel F. pf....	92-92½	Republic com....	49½-55
Bald. Loco. com.	94½-98½	Republic pf.....	86-91
Bald. Loco. pf....	104-105	Sloss com.....	38½-41½
Beth. Steel com..	52-52½	Sloss pf.....	74-75
Beth. Stl. Cl. B..	54½-57½	Superior Steel....	30-30½
Beth. Stl. 8% pf.	104-105	Transue-Williams.	33½-34
Chic. Pneu. Tool..	50½-53	Un. Alloy Steel..	25-25½
Colorado Fuel....	24½-27	U. S. Pipe com...	17½-18½
Cruc. Steel com...	63½-66½	U. S. Pipe pf....	54½-57½
Cruc. Steel pf....	87-88	U. S. Steel com...	82-84½
General Electric.	135½-143½	U. S. Steel pf....	112½-114½
Gt. No. Ore Cert..	32-33½	Vanadium Steel...	30½-33½
Gulf States Steel.	47-50½	Vn. I. C. & Coke..	85½-85½
Int. Har. com....	75-82½	Westingh's Elec.	47-49½
Int. Har. pf.....	101-101½		

Industrial Finances

The Zenith Foundry Co., Detroit, has gone into a receivership, the Security Trust Co. of Detroit being appointed receiver. The company's assets are given as \$255,682 and liabilities \$162,723. It is reported that the officers of the company, which was started in 1920, are considering a reorganization.

Stockholders of the Electric Alloy Steel Co., Youngstown, Ohio, producer of high-speed tool steels and steels of special analysis, on Dec. 1 ratified recommendation of directors for an issuance of \$750,000 of 8 per cent cumulative preferred stock, convertible into common. The purpose is to provide additional working capital. The company is operating its rolling mills and crucible furnace at its Charleroi, Pa., plant and expects to start its electric furnace shortly. Approximately two-thirds of the issue has been subscribed for by interests identified with the company.

Following a voluntary petition in bankruptcy by the Groton Iron Works, Groton, Conn., James Swan has been appointed temporary receiver. A hearing will be held later on the appointment of a trustee. The schedule attached to the petition in bankruptcy gives the liabilities as \$4,028,504 and the assets as \$16,353,018. Of the latter, \$13,153,000, a claim against the United States Shipping Board now pending in the courts, is included. Without this claim, therefore, the assets amount to \$3,200,018. Cash on hand is given at \$18.07. The Groton Iron Works is engaged in shipbuilding, with plants at Groton and Noank.

The Mutual Truck Co.'s plant and equipment at Sullivan, Ind., will be offered at public sale by the receiver Dec. 22. The sale will include 12 acres, with siding to the C. & E. I. and Illinois Central railroads; a large modern brick building with steel truss roof; heating plant, machine tools, drawings, blue prints and a miscellaneous stock of materials and parts for building a 2½-ton motor truck. The First National Bank, Sullivan, Ind., is the receiver and E. D. Maple the trust officer in charge.

Recent dividend declarations include: Railway Steel Spring Co., regular quarterly of \$2 on the common and \$1.75 on the preferred; Haskell & Barker Car Co., regular quarterly of \$1 a share; General Railway Signal Co., regular quarterly of 1½ per cent on the preferred.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The quotations given below are for small lots, as sold from stores in New York City by merchants carrying stocks.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-ferrous Metals."

Iron and Soft Steel Bars and Shapes

Bars:	Per Lb.
Refined bars, base price.....	2.68c.
Swedish bars, base price	10.00c.
Soft steel bars, base price	2.68c.
Hoops, base price	3.53c.
Bands, base price	3.28c.
Beams and channels, angles and tees	
3 in. x ¼ in. and larger, base.....	2.78c.
Channels, angles and tees under 3 in. x ¼ in., base	2.68c.

Merchant Steel

	Per Lb.
Tire, 1½ x ½ in. and larger	2.65c.
(Smooth finish, 1 to 2½ x ¼ in. and larger).....	2.85c.
Toe calk, ½ x ¾ in. and larger	3.25c.
Cold-rolled strip, soft and quarter hard. .625c. to 7.25c.	
Open-hearth spring steel.....	4c. to 6c.
Shafting and Screw Stock:	
Rounds	3.88c.
Squares, flats and hex.....	4.38c.
Standard cast steel, base price	12.00c.
Extra cast steel	17.00c.
Special cast steel	22.00c.

Tank Plates—Steel

¼ in. and heavier	2.78c.
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Sheets

Blue Annealed

	Per Lb.
No. 10	3.28c. to 3.53c.
No. 12	3.33c. to 3.58c.
No. 14	3.38c. to 3.63c.
No. 16	3.48c. to 3.73c.

Box Annealed—Black

	Soft Steel C. R., One Pass Per Lb.	Blued Stove Pipe Sheet, Per Lb.
Nos. 18 to 20.....	3.80c.	.....
Nos. 22 and 24.....	3.85c.	4.50c.
No. 26	3.90c.	4.55c.
No. 28	4.00c.	4.65c.
No. 30	4.25c.	.....
No. 28 and lighter, 36 in. wide, 10c. higher.		

Galvanized

	Per Lb.
No. 14	3.95c. to 4.10c.
No. 16	4.10c. to 4.25c.
Nos. 18 and 20	4.25c. to 4.40c.
Nos. 22 and 24	4.40c. to 4.55c.
No. 26	4.55c. to 4.70c.
No. 27	4.70c. to 4.85c.
No. 28	4.85c. to 5.00c.
No. 30	5.35c. to 5.50c.
No. 28 and lighter, 36 in. wide, 20c. higher.	

Welded Pipe

Standard Steel

	Black	Galv.
½ in. Butt... —55	—40	
¾ in. Butt... —60	—46	
1-3 in. Butt... —62	—49	
3½-6 in. Lap. —59	—45	
7-8 in. Lap... —55	—41	
9-12 in. Lap.. —54	—40	

Wrought Iron

	Black	Galv.
¾ in. Butt... —30	—13	
1-1½ in. Butt. —32	—15	
2 in. Lap... —27	—10	
2½-6 in. Lap. —30	—15	
7-12 in. Lap... —23	—7	

Steel Wire

	Per Lb.
Bright basic	4.90c.
Annealed soft	4.00c.
Galvanized annealed	4.75c.
Coppered basic	4.50c.
Tinned soft Bessemer	6.00c.

* Regular extras for lighter gages.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	17¼c. to 17½c.
High brass wire	17¼c. to 17½c.
Brass rod	14¼c. to 15 c.
Brass tube, brazed	26 c. to 27½c.
Brass tube, seamless	18 c. to 19 c.
Copper tube, seamless	21 c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 21½c. per lb. base.	
Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.	

Tin Plates

Bright Tin	Grade "AAA", Charcoal 14x20	Grade "A", Charcoal 14x20	Coke—14-20	Primes	Wasters
	IC.. \$10.25	\$8.75	80 lb....	\$6.05	\$5.80
	IX.. 11.50	10.25	90 lb....	6.15	5.90
	IXX.. 13.25	11.75	100 lb....	6.25	6.00
	IXXX.. 15.00	13.50	IC...	6.40	6.15
	IXXXX.. 16.50	15.25	IX...	7.40	7.15
			IXX...	8.40	8.15
			IXXX...	9.40	9.15
			IXXXX...	10.40	10.15

Terne Plates

8-lb. Coating 14 x 20

100 lb.	\$7.00
IC	7.25
IX	7.50
Fire door stock	10.00

Tin

Straits, pig	32½c.
Bar	39c. to 41c.

Copper

Lake ingot	16 c.
Electrolytic	15¼c.
Casting	15¼c.

Spelter and Sheet Zinc

Western spelter	6¼c. to 7c.
Sheet zinc, No. 9 base, casks	11c. open 11½c.

Lead and Solder*

American pig lead	5¼c. to 6¼c.
Bar lead	6¼c. to 7 c.
Solder, ½ and ½ guaranteed	22¼c.
No. 1 solder	20¼c.
Refined solder	17¼c.

* Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.	80c.
Commercial grade, per lb.	40c.
Grade D, per lb.	35c.

Antimony

Asiatic	6½c. to 6¾c.
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Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb.	29c. to 31c.
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Old Metals

Values are slightly higher and business shows improvement. Dealers' buying prices are nominally as follows:

	Cents Per Lb.
Copper, heavy crucible	11.25
Copper, heavy wire	10.75
Copper, light and bottoms	8.25
Brass, heavy	5.50
Brass, light	4.50
Heavy machine composition	8.00
No. 1 yellow brass turnings	5.375
No. 1 red brass or composition turnings	7.00
Lead, heavy	3.75
Lead, tea	2.50
Zinc	2.50

